

The Iron Age

A Review of the Hardware and Metal Trades.

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How the Shaft of the Steamer Merrimack was Mended at Sea.

We present herewith four illustrations of unusual interest, showing how a propeller shaft was mended at sea by an engineer. The facts of the case are, briefly, as follows: The steamship Merrimack, during a recent passage from Rio de Janeiro to New York, broke her shaft between Pernambuco and Para, when about 36 hours out from the first mentioned port. The position of the fracture is shown by the dotted line in Figure 1. Having secured the propeller, the engineer, Mr. James C. Fraser, undertook to repair the shaft while the ship proceeded to Para under sail, making slow progress, however. He first moved the thrust block, so as to give him access to the fracture, cut a slot through the shaft and fitted a key. To keep this in place he forged, from such wrought iron as could be obtained about the ship, the clamp and auxiliary bearing shown in Figure 2. Figure 3 is a sectional view of the clamp and key, showing the face of the fracture. With this crude, but effective and ingenious arrangement, the vessel steamed into Para, where a heavy cast iron clamp, shown in Figure 4, was put on in place of the clamp forged on ship board. Without other repairs the vessel steamed from Para to New York. While at Para, Mr. Fraser made working drawings of the shaft, which were sent ahead to New York, and when the Merrimack reached here a new shaft was ready, which was put in its place without taking the brasses out of the ship. There was no unusual delay at this port, and the only time lost by the Merrimack on the round trip between Rio de Janeiro and New York, was the five days during which she was under sail. This, we believe, is a feat without parallel in the history of steam navigation. Mr. Fraser had neither materials nor tools for such an unexpected emergency, and was compelled to work up from stanchions and wrought scrap of all kinds to make the key, clamp and bearing. The fact that he was able to take his ship into Para, with a broken shaft, and that a new shaft could be made from his drawings which dropped into its place without any fitting, show an enterprise and a practical mechanical skill which few engineers possess.

Brass.

We take the following from a very interesting lecture delivered by Dr. Percy, the eminent metallurgist, before the Royal British School of Mines:

What is brass? It is perhaps not so easy to answer that question. I think we shall be justified in restricting the term brass to alloys of zinc and copper only. Antiquarians and collectors of coins frequently apply the term brass to what we should call bronze, or gun metal, an alloy of copper and tin, and this causes much confusion. It is curious to find more than 2000 years ago, in the writings of Pliny, that the same confusion existed. Now, for example, we have pinchbeck metal, Dutch metal, Prince's metal, etc.; worse than all, we sometimes find different terms applied to the same kind of brass. The old term for brass was *latten*, as we find in ancient records, and the modern French name is *laiton*. Brass was known certainly 2000 years ago, in the days of Pliny; for he tells us there was a kind of metal known as *ori chalcum*, which means mountain brass, and it is said to have been very much like gold in appearance. But I think there can be no doubt that the term refers to our brass, inasmuch as no one would mistake gun metal for gold—its color is quite different. With regard to the common properties of brass, it has many advantages over copper; it is harder, and will, therefore, better resist wear from friction. It is a very workable metal, can be cast perfectly, it is very malleable and ductile, can be rolled out and then beaten out (at all events, when it has a certain composition)—Dutch metal, for instance, can be drawn out into fine wire, raised up by stamping. It is agreeable to look at, and much cheaper than copper. When I speak of ordinary brass, without any qualification, I shall mean brass which has a composition in round numbers of two parts of copper to one of zinc. I shall describe the ancient process of manufacturing brass, which has now, however, been generally abandoned, and I do not think there is one furnace, conducted on this process, now in this country, though I saw several in full working order in Birmingham about 30 years ago. The oxide of zinc was in all cases used, and this was mostly obtained by roasting calamine, or carbonate of zinc, hence the name of calamine brass. You will remember that zinc is obtained from this oxide by heating it with carbonaceous matter in a closed vessel. Now, to make zinc we should take some of this oxide, mix it well with charcoal powder, and add a quantity—in proper proportion—of granulated copper; the mixture is then put into large crucibles and heated strongly for several hours. The zinc vapor thus separated finds itself largely

in contact with metallic copper throughout the mass; it continues with the copper and forms brass. The point to be attended to is not to raise the temperature so high as to melt the copper, or that metal would form a layer at the bottom of the crucible, and our object is to keep the copper as much as possible in contact with the zinc. The furnace used is very simply constructed, merely consisting of an oven-shaped building of fire brick; there are no bars, but a plate of iron (protected with fire-clay), pierced with holes for admission of air, and other larger holes (one in the center, and seven or eight at equal distances round the plate), in which the crucibles are set. In the top of the furnace is inserted a cast-iron collar, and over that place a cover of cast-iron, which serves as a damper to regulate the temperature; there is no chimney. There are several of these furnaces built in a row, and enclosing them all is built a large kiln, like those we see in modern glass-houses. The furnaces are built nearly on a

some of the Nuremberg brass is supposed to have been produced by a process of this kind.

Among the varieties of brass is one known as Muntz's metal, intended for sheathing ships. This metal, now so largely employed, is nothing more than brass, consisting of 38 per cent. by weight of spelter, and 62 per cent. of copper. The late Mr. Muntz took out a patent for it, and recommended the proportions of the metals to be used as 40 and 60, but it has been found that they are not the best proportions; it is better not to have so much spelter, as the metal is then not so liable to become crumbly. It can be rolled at a red heat, but if cooled down to a certain degree it is no longer capable of being rolled; cooled still lower, it again becomes malleable. Here is a curious fact about it; a patent was granted to Mr. Collins in 1821 nearly identical with that granted to Muntz; it was the same thing, recommended in nearly the same proportions for the same purposes, and stated to possess the same qualities. I do not

chinery, and are apt to become brittle in the course of wear.

In the ordinary process of pressing or stamping brass, as in making curtain rings, you cannot raise the surfaces by one blow; it requires a succession of blows. This, however, would make it brittle if it were not prevented by annealing the metal from time to time. In the process of annealing it becomes coated with a black scale, which can be detached by means of aquafortis. The process of "dead dipping," to obtain a dull surface, is conducted by dipping the annealed metal into aquafortis (one part of aquafortis to four of water) till the black scale rubs off easily; then after washing in water it is dipped into acid of double the strength; this acid will attack the metal and form a green layer on the surface which really consists of bubbles of gas. When it is well coated it is taken out and washed and rubbed with cold saw dust, and without removing the adhering saw dust is plunged into the strongest acid.

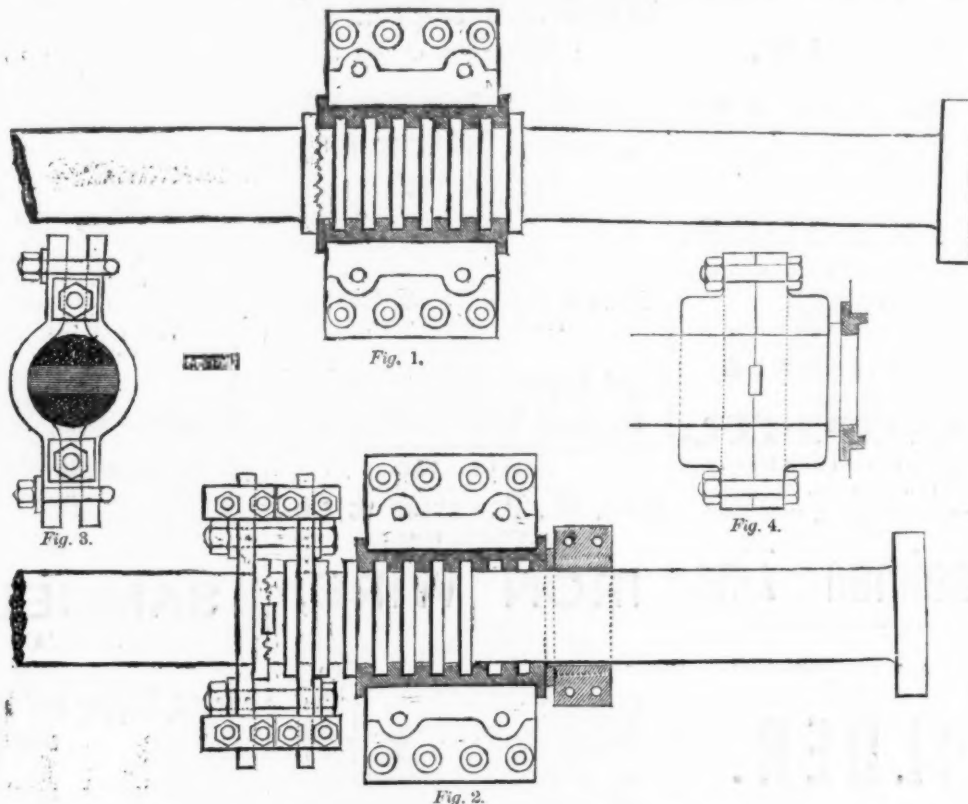
together with bolts and flanges, and provided with a proper sized valve, thus subdividing the 750 feet section into seven compartments. At one end of each section this movable head will be placed 8 feet in from the end, at which there will be a hollow rib. There will be an adjustable sleeve with an inverted flange to connect the sections together. Directly upon the top, and within the 8 foot compartment, there will be a man hole. The two sections of 1500 feet are now complete. The buoyancy of cylinder and timber will be 20,000 lbs. per lineal foot; weight of material, 16,825 lbs. to the lineal foot; therefore, when the tunnel is floated its buoyancy is 3180 lbs. per lineal foot in excess of its weight, which will give it a draft of 14½ feet of water.

Mr. Rich now proposes to dredge a cut 750x23 feet in depth, allowing the top of the tunnel, when submerged, to rest just below the bed of the river, presenting no bar for collection of drifts, and no obstacle to navigation. Those not conversant with deep water dredging have condemned a submerged tunnel from the impracticability of dredging in deep water and swift current. There is, it is claimed, but one kind of dredge that this can be accomplished with, the "Morrison Dredge," with a device, invented by Mr. Rich, expressly for this work, by which he overcomes all uncertainties, either of depth of water or strength of current.

The cut being prepared, the flood gates are opened and the tunnel floated out to its place. Scows are moored up stream, with hawsers leading from them to rings in the side of the tunnel. After being placed directly over the cut the 7 valves are gradually opened and the section sinks slowly to its place, crushing out all the soft mud in the cut by means of the bevel keel. Then, if the position of the tunnel is not right, air would be forced in displacing the water, and the tunnel would at once rise to the surface. After the first section is adjusted in its place the cut for the second section will be excavated, and the earth deposited upon that already submerged, packing it firmly in its bed, and in connection with its own weight of 20,000 lbs. to the lineal foot, making it immovable. This completed, the second section will be submerged the same as the first. The timbers under the first section projecting 3 feet beyond the cylinder, form a guide for the second cylinder to rest upon. A diver enters through the man-hole in the first section and adjusts the sleeve, which is arranged to obviate all deflection from a straight line, bolts the section and sleeve together with a rubber packing between them. He then comes out and secures the man-hole plate; concrete is sent down and the opening filled in; air is pumped into the rubber tube, which encircles the sleeve, and a pressure of 100 lbs. to the square inch put on, which insures a tight joint for temporary use. The other two sections are joined in the same manner. After the approaches are completed to the shore end of the first section of the submerged tunnel the valve is opened and the first compartment of 106 feet pumped out. The adjustable head is unbolted and removed; the interior lined with 16 inches of brick work, laid in hydraulic cement, making the weight of the tunnel 4730 pounds to the lineal foot in excess of the buoyancy, beside the deposit of clay on the top. The next section is then pumped out in like manner, and thus the work progresses until the whole is completed.

It is stated that a tunnel similar in construction was laid across the Thames at Waterloo in 1865, ¾ of a mile long, which has been in constant use ever since; that more rapid progress can be made than in other tunnels; and that the grade would only be one-half that of a tunnel driven under the river bed. Mr. Rich stated that he could build this tunnel for \$4,000,000, and give satisfactory bonds to have the work finished by Dec., 1875.

The Troy Iron Works.—The Troy Times, gives the following in relation to the iron works in that city: "Work will be continued during the present week in all of the mills of Corning & Co. except the 'old' mill, which has not been in operation for several weeks past. Merchant iron is still being stacked in large quantities, although a number of orders were received last week. Notice was given at the steel works and at the Rensselaer Iron Works Saturday, to all the men employed by the month, that after the 16th inst. their services would be dispensed with for an indefinite length of time. The 'bloom' mill will work this week and probably a portion of next week, after which that also will be shut down indefinitely. It is not expected that the works will be in full operation again until the first of July. Work will be resumed in the forge at the Rensselaer Works to day, but the other departments of the mills will remain idle. Notice was given Saturday that the merchant mill connected with the works of the Messrs. Burden on the 'flats' would suspend operations this week, for how long is not known. In consequence of this stoppage a number of hands have been discharged from the shops, making a total of 100 men thrown out of employment. About one-third of the mill hands at the iron works are at present out of employment, by reason of the partial suspension of work in the several mills."



THE SHAFT OF THE STEAMER MERRIMACK, BROKEN AND REPAIRED AT SEA.

level with the ground, but there is an underground passage to each of them for the removal of ashes, &c. When the furnace is working order the charge is introduced into the crucibles, and they are put in their places; the fuel is introduced gradually, and worked down and between the pots, the object being to keep up a uniform temperature. After a lapse of several hours the furnace will have done its work. We then take out the central pot, and shake it well to get the molten metal to the bottom; it occupies but a small space compared with that occupied by the charge. Each of the other pots are taken in succession, and after shaking, the contents are emptied into the center pot, and by this means we get at the end of the process, a crucible full of brass which is then cast into ingot molds, which in former times were made of stone. This calamine brass had a great reputation, it was in high repute for buttons, for wire drawing, and especially for wire intended for paper makers' gauze. I do not see why this brass should be so much better than that made from good copper and zinc in modern times, and I do not think it was. A few days ago we submitted to a vigorous analysis a specimen of this brass, which I obtained some years ago from Birmingham, and it showed:

Copper	60.67
Zinc	34.23
Lead	3.91
Tin	0.17
Iron	0.77
Nickel, cobalt	Traces
Total	99.45

The most remarkable feature is the large percentage of lead; as a rule, I may say the more free the brass is from lead the better it is. The brass is now made by adding spelter to the copper, previously heated to a certain degree. It is made on a very large scale in reverberatory furnaces, and there is some loss due to the volatilization of the zinc. Here is a simple experiment: let anyone take one of the old pens, or a piece of copper, take a crucible, and put a small piece of spelter at the bottom, then on that some charcoal or fire brick, then the disk of copper, and cover all with charcoal; heat strongly, but not too high; a coating of brass will be formed on the copper, penetrating deeper the longer the process is continued;

now wish to get into any argument about patents, but I do say that while in the records of the Patent Office such a patent as that of Collins was written, although it might never have been brought into practice, still another patent, to all intents and purposes identical, ought not to have been granted. To show the varieties of composition in brass, here are the results of analyses of several specimens of commercial brass obtained for me by a friend; the percentage of copper in them being: No. 1, 59.59; No. 2, 63.22; No. 3, 91.44; No. 4, 71.2; No. 5, 64.85; No. 8, 75; No. 9, 72.64. If we take copper and zinc in inverse proportion—two of zinc to one of copper—we shall get a metal totally unlike zinc, very brittle, white, and quite valueless. Some time ago there was a question about cleaning some of the metal statues in Westminster Abbey, and I recommended it should be done with ammonia, something which would not corrode the metal. I thought the metal might be brass, but I found I was mistaken. Here is the exact composition of the metal, the result of an analysis which has not yet been published:

Copper	83.3
Tin	1.52
Zinc	14.47
Lead	0.17
Sulphur, silver, gold	Traces

It is substantially a brass rich in copper; the gold is probably derived from the gilding, the gilding being attached in the manner technically known as water gilding.

Another variety of brass is Dutch metal, which contains a very large percentage of copper; it is rolled out into thin leaf, then beaten out, so as to reduce it to somewhere about 1-32,000 of an inch. Then we have what are known as brass foils, sometimes most beautiful things; it requires a first-rate quality of brass, containing a good deal of copper, to be able to be rolled out thin. Jewelers sometimes employ them, I think I may say not unfrequently. A very short time ago a lady showed me what she thought was a very fine amethyst, but I soon saw that it was only quartz with a piece of foil at the back. And those cheap chains which we see so commonly now, have a core consisting of brass and gold, about eight parts of brass with a gilding of a thin film of gold. They are made by ma-

It is taken out of this almost immediately, and washed in water containing cream of tartar dissolved in it, and lastly it is placed in hot saw dust.

The Detroit River Tunnel.

At a meeting last week, to organize a Vessel Owners' Association, with particular reference to opposition to the bridge project, a new plan for a tunnel on the line of the Chesebrough survey was presented by W. D. Rich, of New York.

It is proposed selecting some convenient place near the bank, and by dredging, to make an excavation 750 feet long, 16 feet below water level, and 60 feet wide on the bottom. At the entrance he arranges a floating gate; the water is pumped out and the dock is ready to commence work on the tunnel. At the bottom of this dock will be built two platforms (base of tunnel), each 750x25 feet, composed of three tiers of oak timber, 12x12 inches, laid crosswise and square, fastened by four locked bolts, the center course diagonally fastened; the bottom 18 inches at center and 4 inches at side, making the platform 42 inches at the center and 28 at the side. Placed upon this will be a cylinder of plate wrought iron, 30 feet in diameter, perfectly tight; encircling this, plate iron ribs, 12 inches in width, 24 inches apart, secured with iron lugs, 12 inches from centers. These circumferential ribs accomplish two purposes: 1. To counteract the collapsing pressure after the structure is submerged, which will be 25 pounds to the square inch at the lowest point in the bed. 2. They are perforated with holes in a triangular form 12 inches from centers, to receive iron rods running parallel with the cylinder for the purpose of joining a perfect network to secure the outside covering, which is composed of concrete eminently hydraulic, 18 inches thick. Between the ribs there will be an iron rod encircling the cylinder, the ends passing through the platform and fastened, securing the cylinder rigidly. Then to the interior of the cylinder, at intervals of 106 feet, there will be an inverted flange 4 inches wide. Attached to these by means of screw bolts and rubber packing is a conical shaped plate iron movable head, composed of three parts, secured

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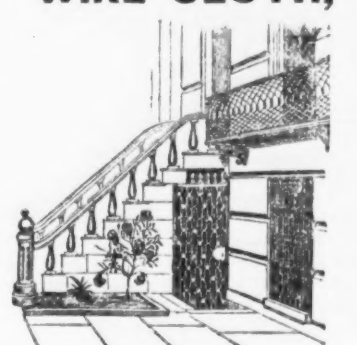
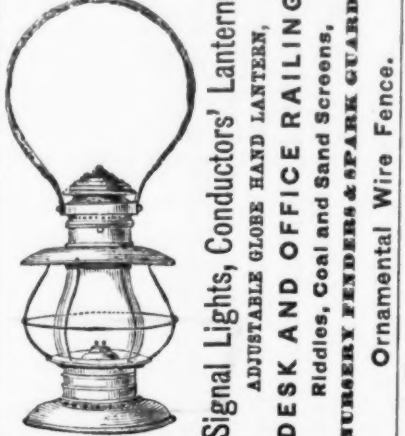
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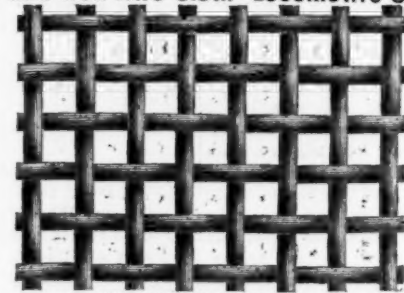
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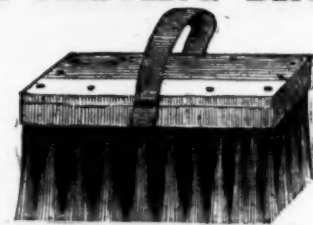
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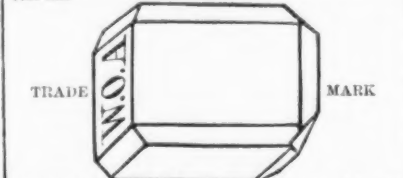
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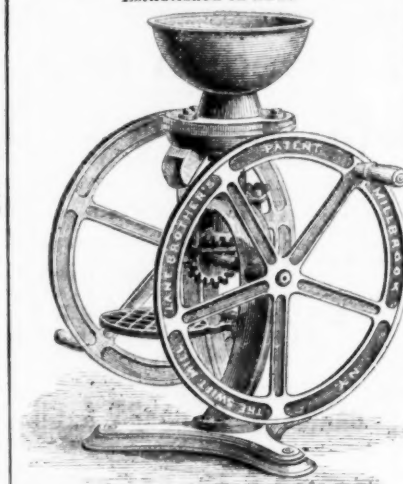
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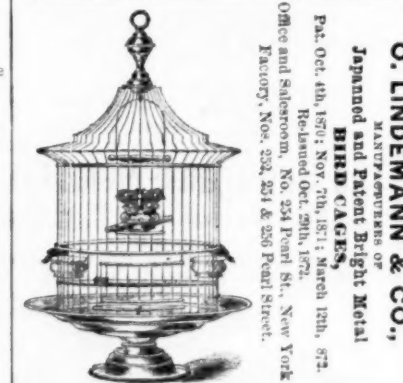
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Notes on the Properties of Metals.

There is a wide difference in metals as regards their affinity for oxygen. Some oxidize very rapidly by mere exposure to the atmosphere. This is especially the case with potassium and sodium. Others absorb it more slowly—as manganese, iron and arsenic; and lead and copper still more slowly. Others, again, do not oxidize by exposure to air, unless at a high temperature; this is the case with tin, zinc, mercury, antimony, bismuth and cobalt, which absorb the oxygen very readily when in a state of fusion. Others, again, do not oxidize by exposure to the air and heat, or by immersion in water, as gold and platinum. The tendency of the metals to combine with oxygen appears, however, to be greatly influenced by their mechanical condition; for some of them, which are only slowly oxidized by exposure to air and heat, are rapidly acted upon when in very fine mechanical division, even at low temperatures.

In combining with oxygen under heat, some of the metals burn with great brilliancy. This is true of copper, zinc, tin and bismuth. Iron filings, when thrown into the flame of a candle, and very fine iron wire, when held in the external part of the flame, take fire and throw off beautiful scintillations. Antimony burns at a white heat, and tellurium burns before the flame of the blow pipe. In short, at intense heats most of the metals may be burned, but some of them resist any degree of temperature below that of the oxy-hydrogen blow-pipe flame. On the other hand, potassium burns by contact with a piece of ice with as much intensity as others do in the oxy-hydrogen flame.

By combination with oxygen the metals lose their metallic characters, and form an important series of definite compounds known as the metallic oxides. These have very different characters and properties. Even the same metal frequently affords oxides which differ widely from each other in properties and appearance. For example, fifty parts of mercury, combining with one part of oxygen, produce a black oxide; and with two parts of oxygen, the oxide is red and highly poisonous. Many of the metals thus afford more than one oxide; and it is to be observed that, when the same metal unites in more than one proportion with oxygen, the oxygen in the second and higher oxides bears a definite arithmetical relation to the first; and when two oxides are thus formed, that having the minimum of oxygen is termed the protoxide, and that with the maximum of oxygen the peroxide.

Among the combinations of metals with oxygen, some are soluble in water and alkaline, such as the fixed alkalies, soda, potash, lithia and the alkaline earths. Others are soluble and form metallic acids. Some are insoluble in water, and have neither taste nor smell, and many, when taken into the stomach, act as poisons. Thus, oxide of arsenic is a notorious and virulent poison; oxide of copper is less virulent than arsenic; oxide of lead is a painful poison; oxide of nickel is also destructive of life; and the peroxide of mercury, unless in small quantities, is likewise poisonous.

CLASSIFICATION OF METALS.
Metals may be divided into five well marked classifications, embracing all which are known to exist in nature. They are as follows:

1. Fusible, and remaining liquids at the lowest heat of temperate climates. Mercury is only one metal which answers to these conditions.
2. Fusible between 392° and 788° F., and passing off into vapor when the heat is still further raised. The metals represented by this subdivision are zinc, cadmium, lead, bismuth, antimony and arsenic or arsenicum.
3. Fusible at temperatures above 1830° F., copper, silver and gold.
4. Not completely fusible by the strongest furnace heat: magnesium, iron, nickel, cobalt, platinum.
5. Fusible in the oxy-hydrogen jet: chromium.

PHYSICAL PROPERTIES OF METALS.
Metals differ as widely in three physical properties as in three other characteristics. The following table makes a fair average showing of the physical properties of the metals commonly employed in the arts:

Metals.	Weight per cubic inch, lb.	Weight per cubic foot, lb.	Specific Gravity.	Tenacity, per square inch, lb.	Stretching force per inch, lb.	Melting Point, Fahr.	Expansion, per cent. per degree.	Conductivity, per inch, lb.	Specific Heat.
Aluminum.....	.092	160	2.56	1066	1066	1800°	.0011	1800	.0007
Antimony.....	.142	252	6.72	3220	3220	1800°	.0011	1800	.0007
Arctic.....	.142	252	6.72	3220	3220	1800°	.0011	1800	.0007
Barium.....	.142	252	6.72	3220	3220	1800°	.0011	1800	.0007
Bismuth.....	.142	252	6.72	3220	3220	1800°	.0011	1800	.0007
Brass.....	.142	252	6.72	3220	3220	1800°	.0011	1800	.0007
Calcium.....	.142	252	6.72	3220	3220	1800°	.0011	1800	.0007
Cadmium.....	.142	252	6.72	3220	3220	1800°	.0011	1800	.0007
Chromium.....	.142	252	6.72	3220	3220	1800°	.0011	1800	.0007
Cobalt.....	.142	252	6.72	3220	3220	1800°	.0011	1800	.0007
Copper.....	.142	252	6.72	3220	3220	1800°	.0011	1800	.0007
Gold.....	.142	252	6.72	3220	3220	1800°	.0011	1800	.0007
Iron.....	.142	252	6.72	3220	3220	1800°	.0011	1800	.0007
Lead.....	.142	252	6.72	3220	3220	1800°	.0011	1800	.0007
Lithia.....	.142	252	6.72	3220	3220	1800°	.0011	1800	.0007
Magnesium.....	.142	252	6.72	3220	3220	1800°	.0011	1800	.0007
Manganese.....	.142	252	6.72	3220	3220	1800°	.0011	1800	.0007
Mercury.....	.142	252	6.72	3220	3220	1800°	.0011	1800	.0007
Nickel.....	.142	252	6.72	3220	3220	1800°	.0011	1800	.0007
Platinum.....	.142	252	6.72	3220	3220	1800°	.0011	1800	.0007
Potassium.....	.142	252	6.72	3220	3220	1800°	.0011	1800	.0007
Rhodium.....	.142	252	6.72	3220	3220	1800°	.0011	1800	.0007
Silver.....	.142	252	6.72	3220	3220	1800°	.0011	1800	.0007
Sodium.....	.142	252	6.72	3220	3220	1800°	.0011	1800	.0007
Tin.....	.142	252	6.72	3220	3220	1800°	.0011	1800	.0007
Tungsten.....	.142	252	6.72	3220	3220	1800°	.0011	1800	.0007
Vanadium.....	.142	252	6.72	3220	3220	1800°	.0011	1800	.0007
Zinc.....	.142	252	6.72	3220	3220	1800°	.0011	1800	.0007

* See Byrnes' "Metal Workers' Assistant" for fuller information on this subject.

The following table represents the ultimate resisting power of metals and certain alloys to a tensile strain, or strain so applied as to tend to pull them apart:

TENSILE STRENGTH OF METALS.
Weight or power required to tear asunder one square inch of

METALS.	Lbs.
Copper, wrought.....	31,000
" rolled.....	30,000
" cast, American.....	24,250
" wire.....	61,200
" bolt.....	36,800
Iron, cast, Low Moor, No. 2.....	11,000
" Clyde, No. 1.....	16,125
" No. 3.....	23,400
" Caldwell, No. 1.....	13,750
" Stirling, mean.....	25,764
" mean of American.....	31,829
" mean of English.....	19,084
" Greenwood, American.....	45,950
" gun metal, mean.....	37,232
" wrought wire.....	103,000
" best Swedish bar.....	72,000
" Russian bar.....	59,500
" English bars.....	56,000
" rivets, American.....	53,300
" bolts.....	52,400
" hammered.....	55,475
" mean of English.....	53,900
" rivets, English.....	65,000
" crank shaft.....	41,750
" turnings.....	55,800
" plates, boiler American.....	62,000
" plates, mean English.....	51,000
" lengthwise.....	53,800
" crosswise.....	48,800
" inferior bar.....	30,000
" wire, American.....	73,600
" " 16 diam.....	80,000
" scrap.....	53,400
Lead, cast.....	1,000
" milled.....	2,820
" wire.....	2,540
Platinum wire.....	53,000
Silver, cast.....	40,000
Steel, cast, maximum.....	12,000
" mean.....	88,557
" distilled, soft.....	131,000
" shear.....	104,000
" chrome, mean.....	170,980
" puddled, extreme.....	170,817
" American Tool Co.....	179,080
" plates, lengthwise.....	96,300
" " crosswise.....	91,700
" razor.....	150,000
Tin, cast, block.....	5,000
" Banca.....	2,122
Zinc.....	3,500
" sheet.....	16,000

COMPOSITIONS.
Gold, 5; copper, 1..... 50,000
Brass..... 42,000
 " yellow..... 18,000
Bronze, best..... 17,000
 " greatest..... 56,788
Copper, 10; tin, 1..... 32,000
 " " 1; gun metal..... 30,000
 " " " 1; small bars..... 80,000
Tin, 10; antimony, 1..... 11,000
Yellow metal..... 48,700

FUSIBILITY.
Fusible Below a Red Heat.

Metals.	Fahr.
Mercury.....	-39 deg.
Potassium.....	156
Sodium.....	190
Tin.....	442
Bismuth.....	497
Lead.....	612
Tellurium, rather less fusible than lead.	
Arsenic, undetermined.	
Zinc.....	773
Antimony, a little below a red heat.	
Cadmium about.....	442

Infusible below a red heat.
Silver..... 1873
Copper..... 1996
Gold..... 3016
Cobalt, rather less fusible than iron.
Iron, cast..... 2786
Iron, malleable. (Requiring the highest heat of a smith's forge.)
Nickel, nearly the same as cobalt.
Palladium.....
Molybdenum.....
Tungsten.....
Chromium.....
Titanium.....
Cerium.....
Osmium.....
Iridium.....
Rhodium.....
Platinum.....
Columbium.....

Almost infusible and not to be procured in buttons by the heat of a smith's forge, but fusible before the oxy-hydrogen blow-pipe.

On the Effect of Phosphorus on Steel.

At the February meeting of the French Society of Civil Engineers, M. Euverte, director of the steel works at Terrenoire, communicated some details relative to the experiments which have been in progress for the past two years at those works, in order to ascertain the point at which the presence of phosphorus in steel becomes injurious. They were led to these experiments by the difficulties they encountered in freeing the metal from this substance. The metal containing the phosphorus was treated in a Siemens-Martin furnace, in the usual way, the charge of ferro-manganese added containing 42 per cent. of manganese. Not only in the first experiment, but in all the subsequent ones, the metal obtained was malleable and of excellent quality. Hence, M. Euverte concludes that phosphorus may exist in the steel without injury, provided that the carbon be at the same time proportionately diminished. The amount of phosphorus which may be present without affecting either the tensile strength of the steel or its malleability is variable; rails of great excellence were made of steel containing 0.3 per cent. of phosphorus and 0.15 of carbon. Though not recommending the addition of phosphorus, M. Euverte believes that, for special uses, steel which contains it, provided the carbon is low, will take an important place in the arts.

There are eight rolling mills in St. Louis county, as follows: Laclede, established 1845, with a capital of \$1,000,000, employing 350 hands, and producing 10,000 tons of iron annually. Vulcan, established 1871, with a capital of \$2,000,000, and employing 1000 hands; pay roll, \$2000 per day; annual product railroad iron, 40,000 tons; pig iron, 30,000 tons, and pig metal, 30,000 tons. St. Louis Steam Forge and Rolling Mill, established 1860, with a capital of \$200,000, and employing 250 hands; turns out annually 40,000 tons of bar iron and 4000 tons of railroad axles. Harrison Wire Rolling Mill, established 1873, with a capital of \$250,000, and giving employment to 150 hands; annual product, 3000 tons. St. Louis Rail Fastening Company, established 1871; capital, \$250,000; employ 70 hands, and produce 3500 tons annually. St. Louis Bolt and Iron Company, established 1873, with a capital of \$125,000, and employing 135 hands; produce annually 6000 tons. St. Louis Steam Forge and Iron Works, established 1862; capital, \$100,000; employ 150 hands, and turn out annually 20,000 tons. St. Louis Rail Mill, established 1865, with a capital of \$340,000, and employing 150 hands, turning out 36,000 tons annually. All these mills combined represent a capital of \$4,165,000, with an annual product of 197,600 tons, and furnishes employment to 2255 hands.

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New Patents.

We take from the records of the patent office at Washington the following specifications of certain patents lately issued, which will be found interesting:

IMPROVEMENT IN ANNEALING AND TEMPERING

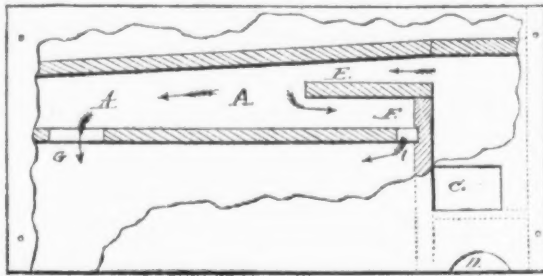
ARTICLES OF BESSEMER STEEL.

Specification forming part of Letters Patent No. 148,990, dated March 17, 1874, issued to Jason A. Bidwell, of Cleveland, Ohio.

The nature of this improvement relates to the treatment of articles, such as wood screws, &c., made from Bessemer steel wire, whereby the articles become much better adapted to general use than when not subjected to the process herein described.

It is well known to those skilled in the art to which this invention belongs, that, in the manufacture of wood screws from Bessemer steel wire in the best condition for working, during the upsetting or swaging of the metal to form the head, the metal about the head and shank becomes contorted or strained, and remains in this torsional condition. Thus the head is liable to crack or break off from the shank. This is particularly the case when any additional strain is exerted upon the head when being forced into wood or other material by a screw driver or other means, as the head is subject to continual torsion by the strain upon the metal in upsetting.

It often follows that, in using the screw, any additional force exerted upon the head breaks



or cracks it off. The inherent properties are thus relieved of the torsion to which it must be subjected in forming the head. The nick in the head for the screw driver also tends to weaken the metal of the head which has been subject to the strain of pressure in upsetting.

The object of this invention is to so treat the screw, or other similar article, after it is made, that it will become tenacious, tough, and capable of enduring all the ordinary strain to which it may be subjected in practical use.

In order to accomplish this result, one mode or process will be given as an example, without confining the process to the means described, as it is susceptible of various changes embracing substantially the same features.

In carrying out this process in one example, reference will be made to the annexed drawing, which represents a side view of the muffled furnace employed in the said process.

After the screws are completed—that is to say, after they are finished by the mechanism required—they are put into suitable pans or vessels, and then placed in the chamber A, there being a door at the rear end into the chamber, through which opening the articles are passed in and out. C represents the fire place, and D the ash pit. E is a bridge wall, under which is one or more flues, F. In the opposite end of the chamber is one or more flues, G. The chamber is heated by the fire from the fire place C.

For fuel, charcoal is preferred, to prevent flame or smoke being brought in contact with screws or other articles in the chamber.

The draft is through the chamber and flues, as indicated by the arrows, and then out through a stack or chimney, in the ordinary way.

The screws are allowed to remain in the chamber until they become a grayish blue (or at a low red heat), care being taken to prevent smoke and flame from coming in contact with the screws, which will tend to excessive oxidation, thereby causing the article to rust, when taken from the chamber, much more rapidly than when subjected only to the action of heat from the fire place, and by which the articles become coated with a thin film, which aids in arresting oxidation. When the screws in the chamber have reached the condition before mentioned, which may be known by examination, they are then withdrawn and allowed to cool; then they are ready for use.

By this process the screws become relieved of the tension acquired during the operation of gathering up the metal and compressing it to form the head. There is a continual strain upon the head of the article by the contortion of the metal in swaging the head, which changes the original character of the metal. This more or less injures the value of the screw.

By the method or process herein described the entire screw, or any part thereof which may have been strained in the manufacturing, is restored to the original integrity of the metal before such strain or torsion took place.

Claim.—1. The process herein described for treating articles made from Bessemer steel wire after said articles have been formed, in whole or in part, into shape by swaging or compression.

2. A wood screw made from Bessemer steel wire, having its head tempered or annealed.

The Iron Ores of Tennessee.

From advanced sheets of a report of the Bureau of Agriculture on the resources of Tennessee, we condense the following on iron ores:

IRON BELTS.

There are four distinct iron belts or areas in

the State of Tennessee, occupying in whole or in part forty-four counties, excluding the Cumberland Table Land.

1. The Eastern Iron Belt. Extends through the State, and lies mainly in front, and at the base of the Unaka Range of mountains. It reaches beyond the limits of the State, to the northeast into Virginia, and to the southeast into Georgia.

2. The Dyestone Belt. Skirts the eastern base of the Cumberland Table Land, or of Walden's Ridge, from Virginia to Georgia; spreads out laterally from ten to twenty miles into the Valley of East Tennessee; the Sequatchie and Elk Valleys are included. This belt reaches far to the northeast beyond the limits of the State, and to the southwest into Georgia and Alabama.

3. The Cumberland Table Land. Co-extensive with the Coal Measures of the State, and extending into Kentucky and Alabama. The ores in this area, being clay iron stones, and black bands that have never been used for the making of iron in this State, but form by far the largest amount used in England. In Pennsylvania and Ohio they are of great value. We have not included the counties of the Table Land among those containing iron ore, for the reason that there is some doubt whether the ore exists in workable quantities.

4. The Western Iron Belt. Lies west of Nashville, or say west of the Central Basin; is mainly between the latter and the Tennessee River, though extending a few miles in some

counties west of the river. Northward it reaches into Kentucky.

THE EASTERN IRON BELT.

This belt embraces the extreme eastern tier of counties, viz: Johnson, Carter, Washington, Greene, Cocke, Sevier, Blount, Monroe, McMinn and Polk; to these we may add Sullivan, which adjoins this belt on the northwest.

Along the North Carolina line is a great double range of mountains, constituting one of the natural divisions of the State, and denominated the Unakas. This range of mountains consists of several long, high, parallel ridges, intersected by deep cuts or chasms, through which the Watauga, Nolichucky, French Broad, Big Pigeon, Little Tennessee, Hiwassee and Ocoee rivers flow out of North Carolina and Georgia into this State. A part of this range is called Smoky Range. The ore banks of the Eastern Iron Belt lie mainly to the northwest of this Smoky Range, some of them, however, occurring in the valleys and coves between the more westerly ridges.

The most important ore found is limonite.

This ore does not occur in regularly stratified beds like the dyestone, to be mentioned, nor in true veins like many other metalliferous minerals, but is met with in irregular masses of all sizes, from small lumps (shot ore) up to blocks ten or fifteen feet in diameter. The matrix is composed of clay, gravel and decomposing rock. A spot of ground (it may be a knoll, part of a ridge, or part of a mountain slope), in which the ore is discovered by digging, is called a bank. A bank may be defined to be an area beneath which lies a considerable depth of clay, sand and rocky debris, interspersed with which iron ore (limonite) is to be found in greater or less quantity, the ore presenting itself, as stated, in irregular masses of all sizes up to blocks as large as railroad coaches. The banks differ much in quantity of ore—some are said to be rich; others are poor, requiring the removal of much foreign matter; others, again, are little else than clay and debris—all require the removal of more or less dead matter before the ore can be obtained. In many banks great excavations, mostly open to the day, have been made, into which large buildings might be tumbled. The banks, although in some cases a hundred feet in depth, are superficial formations, and rest upon stratified limestones, shales and other rocks. As may be inferred, mining in such banks is rather an uncertain business, both as to the quantity and the exact position of the ore. Nevertheless, the best of them yield an abundance of mineral.

In a given valley, or on a given ridge, there may be from one to a dozen banks, the latter of any length from a hundred yards to a mile. In the Eastern Belt, banks occur in all the counties. Johnson and Carter contain many of them, some of which are exceedingly valuable. In Greene county there are very good banks. Two large furnaces have been erected in this county since the war, and are doing a good business. The ore yields from forty to fifty per cent. of tough gray iron.

Limonite, as has been stated, is the principal ore of this belt. In addition to this, black magnetite occurs at one point at Crab Orchard, near the North Carolina line, in Carter county. How much of this there may be we are not able to state. Much excellent bar iron has been manufactured from it in a common bloomery. In Sullivan county, in addition to the limonite banks, are veins, or banks of red ores, hematites. The Crockett and Sharp banks afford this variety, and are capable of supplying much good ore. In McMinn county is a remarkable deposit of stratified red ore, which, on account of its proximity to the Unaka Range, we include in the Eastern Belt. This is Hill's Bank. The ore is a bedded, fossiliferous rock, much like

the ore of the Dyestone Belt, to be mentioned. This bed of ore is noticeable from the fact that it belongs to the lower silurian series, while the dyestone belongs to the upper silurian. The main deposit is a third of a mile or more in length, and at some points fifty or sixty feet wide.

The Tellico ores, in Monroe county, are varied. The limonite is most abundant, but there are a few localities where the hematite and magnetite are found. The hematite ore is so compact that blasting powder is used in raising it. It is very pure, having a few seams of yellow and white ochre.

Shot ore is likewise found in this vicinity. Donnelly's bank is the name of the principal deposit of this ore. A tunnel has been driven into a ridge, and for a while large quantities were taken out that yielded in the furnace fifty per cent.

Many years ago the immense masses of brown hematite which cap the copper veins at Ducktown, in Polk county, attracted the attention of iron men. Many attempts were made to work it, but the small percentage of copper ore present made the iron worthless. Time may develop processes by which it can be made available, but at present the quality of iron is what is called "red short," and is almost worthless for any practical purposes.

There are now in operation, or temporarily suspended, five furnaces in the Eastern Iron Belt; one in Carter county, one in Washington, two in Greene, and one in Johnson. The quantity of iron made is small, on account of the inadequacy of railroad facilities. While the quantity produced in this region will not exceed 10,000 tons annually, the capacity of the furnaces is equal to the production of 15,000 tons. This charcoal cold blast iron is very superior. Its chilling properties are just such as to make it most suitable for the manufacture of car wheels, and nearly all the iron made in this region is consumed in Knoxville and other points for that purpose. It has been pronounced equal to the best made anywhere for car wheels, axles, locomotive tires, and, indeed, everything in which toughness, elasticity and strength are required. A fair test was also given to this iron at West Point, for army purposes, and proved entirely satisfactory.

THE DYESTONE BELT.

This belt of iron ore is remarkable for its length and richness. It skirts the eastern base of the Cumberland Table Land, and extends in our State from Chattanooga to Cumberland Gap, a distance of one hundred and sixty miles. The following counties, or parts of them, are embraced within this belt: Hancock, Claiborne, Grainger, Union, Campbell, Anderson, Roane, Rhea, Meigs, James, Bradley and Hamilton. As before stated, the belt includes the Sequatchie and the Elk Fork valleys, which places parts of Marion, Sequatchie and Bledsoe counties within its area.

The chief ore of this belt is a stratified red iron rock, called at many points dyestone, being sometimes used for dyeing purposes. It is highly fossiliferous. Like a limestone, or a bed of coal, and unlike the limonite of the eastern belt, it occurs in layers. Its quantity, in any given locality, can therefore be estimated, and the result of a given amount of mining can be calculated with some precision.

One hundred pounds of the pure ore might be made to yield seventy pounds of iron, but, as in case of limonite, the impurities defeat this maximum production. In practice from forty to fifty per cent. (and rarely sixty) may be regarded as good work. The ore usually soils the fingers readily. At some points it is hard and is quarried out in blocks; occasionally it is soft and easily crushed. The impurities in it are sandy and argillaceous matter and carbonate of lime. Originally much of it contained limestone matter, this having been in the course of ages leached out, leaving red layers as we now find them.

One, and at many points, two or more layers of dyestone outcrop at the eastern base of the Table Land, almost without a break, throughout its whole extent from Virginia to Georgia. Also in many of the minor ridges, lying from one to a number of miles from the Table Land, but running parallel with its eastern border, are other outcropping layers. The latter will perhaps, in the aggregate, equal an outcrop extending continuously through the State and following the direction, as above, of the outline of the Table Land. In addition there are lines of outcrops in Sequatchie and Elk Fork valleys. Elk Fork Valley is in the extreme northwestern part of Campbell county.

One of the richest deposits of this ore occurs within a few hundred yards of Cumberland Gap, and extends without a break twenty miles along the mountain, and is half a mile in width. It forms a regular stratum of Walden's Ridge, four feet beneath the surface, and varies from eighteen inches to three feet in thickness. This stratum is parallel with the slope of the ridge, and forms a complete sheet or shield, with an overlying stratum of clay, sand and gravel. The ore is raised with picks and thrown out in large broad sheets. It is here very hard and massive. The whole cost of raising this ore at Cumberland Gap, and depositing it in the bridge left ready for smelting, is one dollar per ton. This fact will be appreciated by the reader when he reflects that ores delivered ready for smelting in the Pittsburgh furnaces cost from ten to twelve dollars per ton. On the spurs which shoot out from the Cumberland Table Land are deposits of limonite iron ore of superior excellence, yielding from the furnace fifty per cent. This ore caps the hills, forming a ledge with intermingling gravel from sixteen to eighteen feet in thickness. Some of these beds are said to have an unusually small quantity of dead matter. In other places in the same vicinity are said to be deposits of the black oxide and silicious iron ore, which have never yet been tested in a furnace.

Limestone for flux, and sandstone for hearths, are found all through the dyestone region. Coal, too, abounds in juxtaposition to the iron ore, though preference, until the establishment of Rockwood Furnace, was given to charcoal, for the manufacture of which there are ample supplies of timber. Until the erection of Rockwood Furnace, since the war, stone coal had never been used in this State for the smelting of iron.

Very fine deposits of this dyestone ore occur in the Half Moon Island region, both on the island and on the mainland. Being on the river, it is easily transported at small cost to Chattanooga and other points. Before the war a large furnace was in operation at Chattanooga, which used the ore from this region.

(To be continued.)

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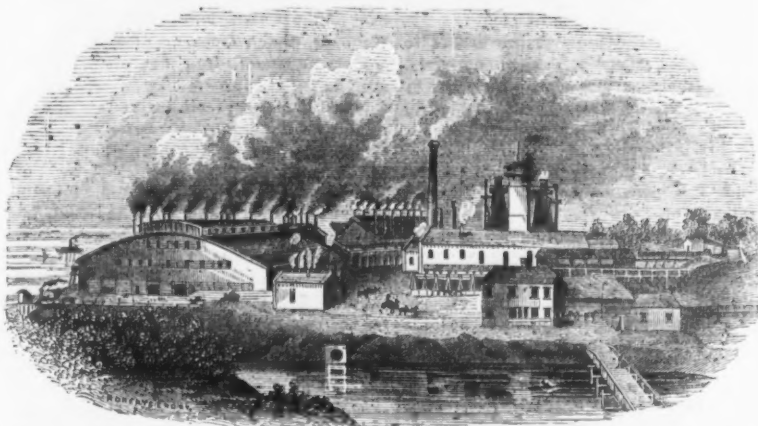
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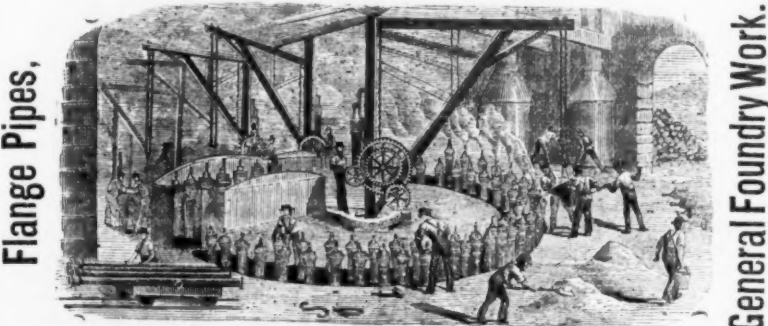
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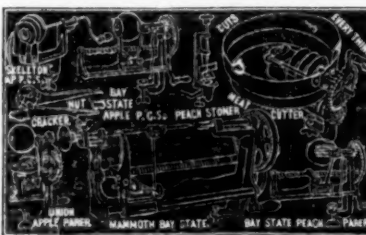
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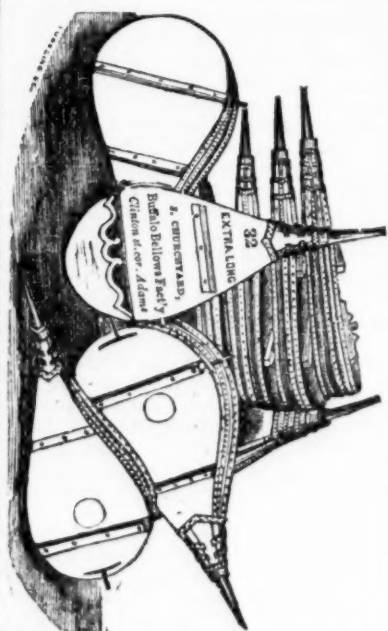
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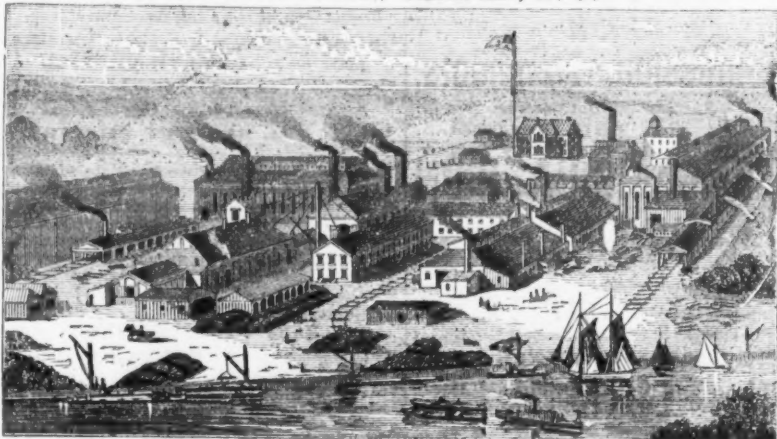
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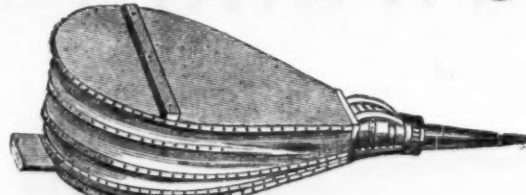
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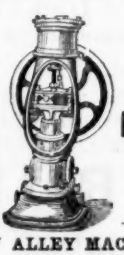
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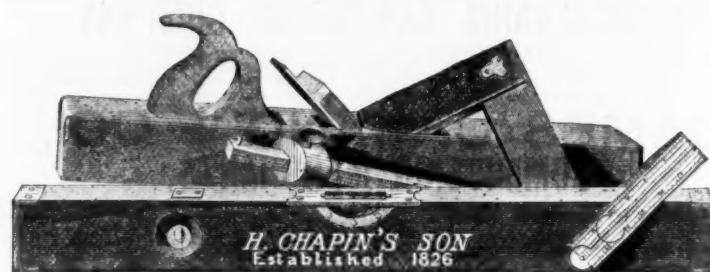
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Architectural Iron Construction.

Condition of the Architectural Iron Business.—Capital Invested.—J. B. & J. M. Cornell's Shops.—The Architectural Iron Works.

(Continued.)

The condition of the architectural iron business at the present time is not very encouraging. Two of the larger shops are fairly busy, although by no means running at their full capacity. Most of the remaining shops are doing very little, and some are quite deserted. This stagnation is ascribed by most of the employers to the effect of the strikes during the past two years, and the extensive competition that has sprung up during the last ten years. Both of these causes have undoubtedly had a great influence in bringing about this state of affairs, but especially the former. The abnormal condition, as regards wages, is regarded by some of the principal establishments as nearly at an end, and with a reduction in the cost of labor of 20 per cent., and of material of nearly 30 per cent., it is thought that there is a good prospect of a revival in the trade during the coming spring. One of the heaviest works in the city is the new Post Office, the roof of which is being rapidly finished. This building has required a great deal of iron work in its internal arrangements, and is a model fire-proof building. It covers 1½ acres. This space for the cellar, basement and entrance floors is not divided up by interior walls. The supports for the upper stories consist of 122 cast iron pillars on each floor. These columns are each 18 inches in diameter, the iron being 2½ inches thick. There will be four stories from the ground up to the base of the mansard roof. The latter will be of copper, the sheets being corrugated to allow of expansion and contraction from heat and cold. Each window will have fire-proof shutters made of a composition lighter than fire-brick, which has been tested to a white heat without change. The shutters rest in cast iron boxes built in the wall, and in which they slide. The floors throughout the building are made with iron beams and brick arches. Four elevators furnish the means of communication between the floors.

THE CAPITAL INVESTED

In this city in the architectural iron interest is about two millions and a half, and the amount of business transacted per year is estimated at about five millions of dollars. This business is mostly done by five shops, viz.: J. B. & J. M. Cornell's, the Architectural Iron Co.'s, Jas. L. Jackson & Bro.'s, the Excelsior Iron Works, and the Aetna Iron Co.'s. The works of each of these parties are quite extensive. They generally consist of a foundry, machine shop, finishing and fitting shop, and a pattern shop. Each of the departments, in most cases, embraces several shops.

J. B. & J. M. CORNELL'S SHOPS

are located at the foot of West Twenty-sixth street, and are very extensive. The fitting and finishing shops cover an area of 450 by 200 feet, and extend from Eleventh avenue to the river. In front of the shop, and between it and Eleventh avenue, is a large open lot, in which work is generally erected before being sent out. The foundry covers about 30 city lots, is situated on the block bounded by Twenty-fifth and Twenty-sixth streets and Tenth and Eleventh avenues. There is also a large open space at one end of the foundry, in which are stored coal, pig iron, flasks, sand, etc. In this yard is placed a large and powerful derrick, capable of reaching any part of the yard. Its mast is 40 feet high and boom 35 feet long. The foundry has three cupolas, capable of running 45 tons of iron per day. The drippings from the ladles in manipulating this large quantity of iron are necessarily great, but as these are gathered up and sifted, and the interior lining of clay in the ladles treated in the same manner, and the iron remelted, very little is ultimately lost. The foundry is provided with six large cranes capable of reaching any portion of the shop; some of these will raise fifty tons. There are, in addition to the former, eight smaller cranes employed in the foundry. This shop consists of eight rooms. It is provided with two ovens for baking the cores, one of which is 22 feet long by 20 feet in width and 5 feet high, the other is a little shorter. About 250 men are employed in the foundry.

The fitting and finishing shop offers accommodations for 1500 men. It is a one story building, covering a large area, and well provided with conveniences for illumination, to be used when it is necessary for the men to work after daylight. The machinery is propelled by two engines placed beside each other, and situated near the western end of the shop. One of these has a horse-power, and the other of 20 horse-power, and both were made by the Utica Steam Engine Company. There are two main lines of shafting, one 350 feet and the other 150 feet long. There are also other shorter lines. Near to the engine is placed an upright drilling machine, geared in the same manner as a lathe, furnished with cone pulleys, etc. It stands 12 feet high, and its shaft is 10 inches in diameter. Its platform has a diameter of 3½ feet. This machine is especially adapted to heavy work, and is very accurate. The shop has 6 of Dick's punching and shearing machines. Each will cut iron 1 inch thick by 6 inches in width, and will punch holes 2 inches in diameter through 1½ inch iron. There is also one punching machine, which was made in the shop during the war for punching the holes through the turret plates for the monitors Miantonomah and Tonawanda. It will punch 1½ inch holes through 1 inch iron. These machines are provided with 5 small cranes for swinging and manipulating the girders or plates upon which these machines are intended to operate. Each crane will swing 5 tons, and is easily managed. There is also a Dick's machine for cutting plate iron. This will cut ¼ inch iron and will take in a piece 30

inches in width. There is also a shearing machine for cutting thin iron of any width, and in one portion of the shop is a slotting machine for slotting heavy work, such as girders. A combined punching and shearing machine, made by the Industrial Works, is kept constantly running. The punch in this machine is on one side of the standard and the shearer on the other, and as one rises the other descends. It will punch one inch iron, and will shear the same size. Power is communicated to this machine from the main shaft by a gear wheel 5 feet in diameter, and it is provided with a fly-wheel 3½ feet in diameter. There are several of Dick's hand punches in the shop, each of which will punch 1-18 inch iron. There are also several other hand punches of different patterns. In the blacksmith department there are 20 forges, the blast for which is provided by a noiseless blower.

The shop also contains a large furnace for tempering steel and plates for safe work. The oven is 12 feet deep and 5 feet wide. Its floor is of brick, and it is so arranged that the fire can be built under it by which it may be heated to a white heat. The flames also enter the oven and are deflected down upon the steel plates placed there, and afterward pass out through the stack. Near the oven is a vat used in the tempering process, 12 feet deep, supplied with water by means of pipes which fill the vat from the top. The pipes which lead the water off are at the bottom, and a current of cold water is kept constantly passing through the vat. The whole contents can be discharged in two minutes. Several large wooden wheels, covered each with two coats of emery, are kept constantly running. Under such circumstances a wheel will last about two days. The diameter of these wheels is 4½ feet and face 8 inches. About 15 small, solid emery wheels are also used in various parts of the shop. The latter also includes a room about 50 by 25 feet in dimensions where patent vault lights are manufactured.

The machine shop is situated in the same building as the foundry, and includes in itself several large rooms, all on the ground floor. A very extensive collection of a fine order. There are two planers measuring 18 feet by 5 feet; two smaller planers measuring 12 by 3 feet; three large lathes for turning the ends of columns square, and which turn both ends at the same time. One of these lathes will swing 7 feet and the other two, each 4 feet. The distance between the heads is 24 feet. There is also a large lathe which will swing three feet and take in 22 feet. There is also a side planer with which the plates for four monitor turrets and eight pilot houses were turned; it will take in a plate measuring 12 by 10 feet. The lathe comprises also two lathes which will each take in 18 feet and swing 2 feet; two smaller lathes, each of which will take in 6 feet, and swing 1½ feet; two machines for corrugating iron, each of which will take in a sheet 9 feet wide. One of these, and the most effective one, is the invention of the foreman of the machine shop, Mr. Moffatt. There are also two machines for making fireproof lath; a machine for circling corrugated iron; a shaping machine; a horizontal drilling machine; upright drills; a pair of rolling shears used for cutting up light stuff (not heavier than No. 22); and tumbling barrels for cleaning castings. These are simply cylinders in which castings are placed along with scrap iron, and which are being made to revolve so that castings are cleansed by the rubbing of the scraps against them. One of these barrels is 8 feet long by 3 in diameter, and the other 4 feet long by 2 in diameter. A single geared lathe is located in the engine room. This lathe takes in 5½ feet. The engine has a 4 foot stroke and 18 inch bore, and is supplied with steam by two boilers whose total capacity is nominally 160 horse-power, although the engine seldom employs more than from 60 to 80. In one portion of the shop are three large cranes.

The pattern shop embraces three large floors, and employs a large number of workmen. The usual wood working machinery are found here, such as planers, circular saws (cross cut and ripping), band saws and lathes. One lathe in this shop can take in a piece of work 32 feet long.

THE ARCHITECTURAL IRON WORKS,

which is the oldest establishment of the kind in New York now running, is situated in East 13th and 14th streets. It is divided into two shops, one portion being located between these two streets and between Avenues B. and C., and the other covering about 17 city lots, and situated in the block bounded by East 13th and 14th streets and Avenues D. and C. The east side of the latter shop is on Avenue D. The former shop covers about 27 city lots, and consists of one large building of 4 stories, and another large building of an L shape and one story high. In this portion of the works are situated the pattern, fitting and machine shops and the foundry. The building encloses a yard covering an area measured about 75 feet by 40, in which are a scored the stocks of pig iron, sand, etc. In the center of this yard is a large derrick 60 feet high, with a boom 40 feet long. This derrick reaches every portion of the yard and of the first or second stories of the building, so that goods can be delivered at any desired point within this range.

The foundry, which is on the ground floor, is provided with three cupolas, two of which have a capacity of 20 tons each, and the other about ten. At present they are not running more than 15 tons per day. The casting of such large pieces of iron as are used in architectural iron work requires great care and judgment, and, indeed, the business of erecting iron buildings has very much advanced the art of making heavy castings. Two large ovens for baking cores are now used.

The machinery department of these works is very extensive, and is constantly being in-

creased as circumstances require, for this concern prides itself on the variety of its special machinery, and the fact that it is constantly building some new machine for special uses. The engine which furnishes power for this and the fitting shops above has a 3 foot stroke and 18 inch bore. It can be worked up to 100 horse-power. It has a heavy cast iron fly-wheel 14 feet in diameter. It has a return flue boiler, 5 feet 6 inches in diameter and 16 feet long. The blower is a Demphill. One line of shafting extends through the shop. The machinery includes a large lathe for general use, which will swing 9 feet and take in a column 40 feet long; five lathes, each of which will swing 40 inches and will turn a piece from 15 to 30 feet long; seven lathes of small sizes; several screw cutting and chuck lathes; several bolt and nut cutting machines, one of which cuts a bolt of any size from 4 inches downward; several planers, one of which will take in a piece 5 feet square and plane 30 feet long; a self-feeding drill, so arranged as to be suitable also for facing; gear cutting machinery, and a large lathe fitted with different speeds. A number of machines are located in the foundry from want of room in the machine shop, such, for instance, as punching and shearing machines. Here, also, are cranes for manipulating the columns and other heavy bodies, and here the irregularities of castings, as they first come from the mold, are removed.

The second, third and fourth floors of the building are devoted partly to fitting and partly to pattern shops. One of the fitting shops is situated on the second floor, and is about 200 by 50 feet long. At a large doorway opening upon the streets is located a large crane for delivering goods. There are two cranes in this shop, and here are fitted together fronts, railings, roof ornaments, etc. The shop is well supplied with lathes, planers and drilling machines. A railroad is laid upon the floor for the use of the lathe. On the floor above is another shop, in which stairways, railings, etc., are fitted together. On this floor is a forge for straightening cast iron, and two machines, each 9 feet long, for giving the proper curve to slats intended for what is known as the pig tail rolling shutter. Here, also, are machines for making iron lathes, and hand punching machines so arranged that dies of various shapes can be placed in the punches. The latter are used in ornamenting iron shutters and in making Venetian blinds.

The pattern shops are two in number, each about 50 by 150 feet in dimensions, and are well furnished with machinery. From 50 to 75 pattern makers are here employed. A small room extends from one of the finishing shops in which patterns are molded in clay. Here, also, the capitals and other small ornamental work are painted and fitted together.

In the shops at Avenue D most of the wrought iron work is performed, especially such heavy work as the manipulation of girders, etc. The building is one story high, and forms the three sides of a hollow square. In the open space thus enclosed, which is about 85 feet square, work, such as roof trusses, is often laid out. The building is supplied with a full complement of machinery, especially shearing, punching and drilling machines. A heavy machine for punching large plates or girders is located in one corner of the shop, and was devised in the works for the purpose of punching the ornaments on the rafters in the Grand Central depot, in New York. It can be operated very rapidly, and will take in large pieces of work. There is also a machine for shearing one-half inch iron, which will cut very wide strips. In this machine a wheel, connecting with the main shaft by a belt, imparts motion to a lever by means of a connecting rod. By the aid of another connecting rod the motion of the lever is transmitted to the blade which is itself affixed to a lever. Here is a horizontal drill which was used during the war for threading the holes and plugs in boom shells for use by our government.

At one end of the shop is a large platform on which work is usually laid out and fitted together before it is shipped. Near the platform is one of Dudgeon's hydraulic presses, of which the company own a number, capable of exerting a pressure of from seven tons upward. The shop is well supplied with forges, and a complete overhead railway, running around the shop, is used in transporting from one place to another the heavy articles with which such works have to deal.

We omitted to mention, in the last number of *The Iron Age*, that the engraving of the store front, on our first page, was from the catalogue of J. L. Jackson & Bro., iron founders, whose works are situated in East 28th st., between 1st and 2d avenues.

Iron Works at Huntington, Ohio.

The Huntington Adviser says:

There has been considerable talk about starting a blast furnace and mill and rolling mill in Huntington. But this enterprise has at last assumed a tangible shape, and will become a fixed fact if present arrangements are not interfered with. The whole capital stock will be \$150,000. Mr. Harvey, in this city, who has been extensively engaged in the coal and iron business, has sold out elsewhere and will invest largely in building a furnace and mill.

Mr. Kirk, who will reside with us for the purpose of engaging in the iron business, has been abroad soliciting capital; he is a man of extensive theoretical knowledge, combined with the skill and experience of practical workman. Mr. Truby, connected with the Bellefonte Iron Works, Ironton, Ohio, a gentleman of considerable means, will take charge of the mill factory. He has the reputation of being one of the best nailers in the Ohio Valley, and has always had the best job in the factory at Ironton. He has also been successful in securing the aid of many of the other practical nailers.

Harry Weddle is spoken of as the forge manager, and is also a boiler by trade, acknowledged to be as good as there is in making a good quality and yielding weight.

Mr. Truby and Mr. Weddle have in view sufficient trained and experienced workmen to man both the factory and forge departments, and have had \$30,000 subscribed by the workmen of Ironton.

THE NICHOLSON FILE.

All Nicholson Files are cut with the Patent Increment Cut, an invention owned and controlled exclusively by us, the file cut in this manner being Patented as a new article of manufacture, and differs from all other machine cut files (all of which have their teeth cut with equal spaces) by being cut with teeth slightly expanding or increasing in size and space from the point, thus avoiding the too great regularity of teeth common to all other machine cut files. The tendency of all cutting tools with teeth or cutters placed at regular distances from each other may be illustrated (to the machinist at east) by the fluted reamer—as it is well known that if a round reamer be made with (say 12) teeth whose spaces are equidistant, the hole reamed will not be round and smooth, but will approximate to a hexagon in shape. Whereas, if the same number of teeth be made of irregular distances, the hole reamed will be both round and smooth. The same is true of a file, hence the necessity of its having teeth at unequal distances, and to which we have applied the name of Increment Cut File, which possesses all the advantages of hand cut work, and the accuracy and uniformity of machine work. It is now upwards of seven years since this File was introduced to the public, and the demand has increased until our production is undoubtedly treble that of any File manufactory in the country.

We put all files under seven inches in boxes of either one-half or one dozen each. These boxes are neatly arranged, and open on the end, on which the kind is plainly marked with printed labels, acknowledged improvements on the old methods.

The "Increment File" is not an experiment, but an established fact, and already has acquired a legitimate demand for upwards of 500 dozen per day. We employ no regular Travelers, but our goods may now be found in the hands of the principal jobbers and dealers throughout the country.

Prices and terms will be forwarded on application to

NICHOLSON FILE COMPANY,
Providence, R. I.

Established 1816.

Peter A. Frasse & Co.,

95 Fulton Street, New York,

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Thomas Turner & Co.'s Suffolk Works,
SHEFFIELD.

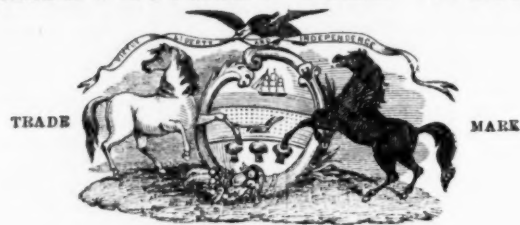
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And Importers of

P. S. STUBS' FILES, TOOLS & STEEL,

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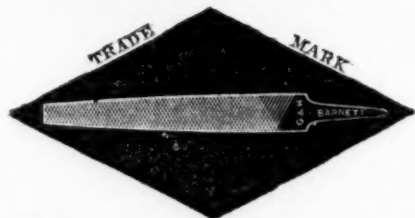


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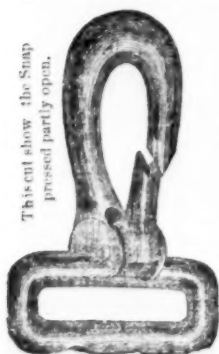
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Every one warranted to give satisfaction, or no sale.

See Advertisement in this Paper, April
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Patent Parallel

Machinist's Vise

Manufactured by

Harrisburg Foundry and Machine

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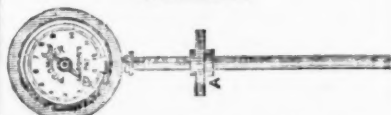
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Send for Circular and

Price List.

PYROMETERS
for BLAST FURNACES.

E. BROWN'S STANDARD PORTABLE,
E. Brown's Improved
Gauntlet



Edw. BROWN,
311 Walnut St., Philadelphia.

ALSO FOR SALE

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For Baker's Ovens, Boiler Flues,
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canizers, Superheated Steam.

E. Brown's Portable Blast Gauge for
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Over 200 Gauntlets and 60 Port-
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Coopers' & Turpentine Tools.

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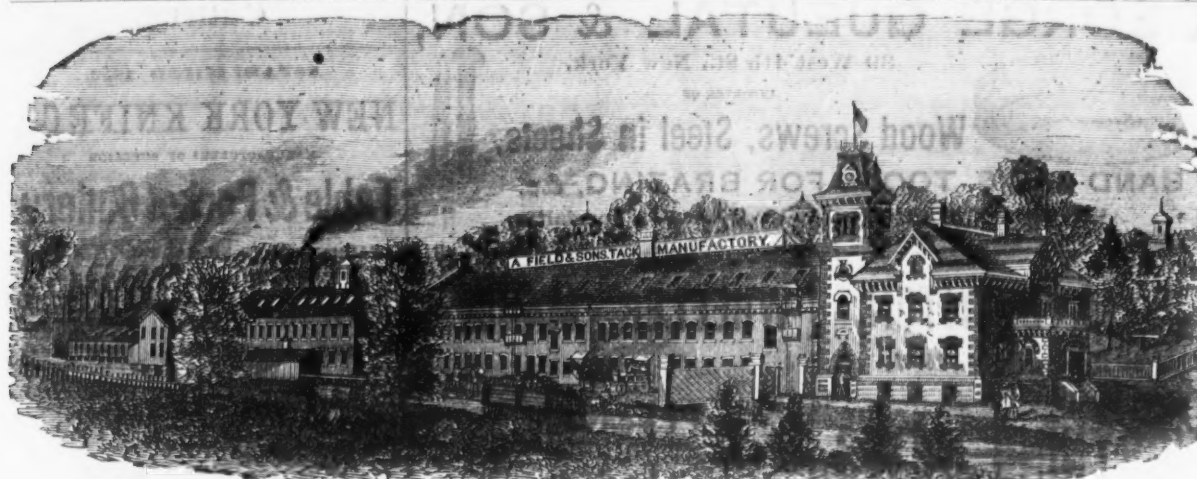
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Copper and Iron Tacks, Tinned Tacks,
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Fine Two Penny and Three Penny Nails, Channel, Cigar Box and Chair Nails, Leathered Carpet Tacks, Glaziers' Points, etc., etc.
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Any variations from the regular size or shape of the above named goods made from samples, to order.



Washoe Tool Mfg. Co.,

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Having doubled their Manufacturing facilities, they can now fill orders promptly.

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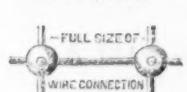
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Catalogues and Price Lists sent post free on application.

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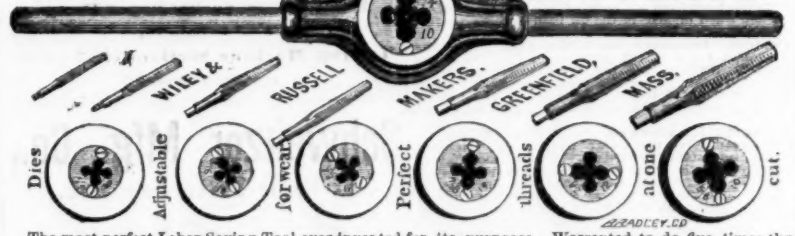
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Bright Metal

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GRANT'S LIGHTNING SCREW PLATE



The most perfect Labor Saving Tool ever invented for its purposes. Warranted to do five times the work possible with any other screw plate. Also HAND BOLT CUTTING MACHINES, ranging in price from \$60 to \$300. POWER BOLT CUTTERS, from \$175 to \$350.

FINE FRICTION CLUTCHES.
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Something New for
OTIS FURNACES & MINES.
New Union Steam Safety Elevator,

How One Works.

RIVERSIDE IRON WORKS, DEWEY, VANCE & CO.,
Wheeling, W. Va., January 14th, 1873.

Messrs. OTIS BROTHERS & Co., New York.
Dear Sirs: The experience of a year proves that your Furnace Elevator is superior to all others in use. We have in the six weeks from December 1st to Sunday last, made 9724 tons, 1401 lbs. Pig Metal, or an average of near 65 tons per day, which required the elevator to lift 73 feet high 4 1/2 tons Ore, Coke and Limestone for each ton of metal produced, or more than 11,500 tons material in the 6 weeks. The largest yield in one day was 81 1/4 tons Iron, involving the lifting of 34 1/2 tons material in 24 hours. This has all been done to our satisfaction, and that, too, in the coldest weather we have had. Other furnaces with water and pneumatic hoists have experienced great difficulty, on account of the water freezing in the tanks; and in the case of the air hoists, we understand that two furnaces, not far from us, had to "blow out," from being unable to hoist stock during the "cold snap." The difficulty, we are told, was caused by the condensed moisture in the blast freezing to the sides of the cylinders, so that the piston could not move up or down.
Very truly, yours,
DEWEY, VANCE & CO.

for Circular to

OTIS BROTHERS & CO.

348 Broadway, NEW YORK.

BUSINESS ITEMS.

PENNSYLVANIA.

The Beaver Argus and Radical says: The New Brighton Chain Works Company are remodeling the interior of the car factory building in that place, preparatory to commencing the manufacture of chains of every description. As soon as the twelve machines, which the company propose to run, are put in operation, the works will give employment to about fifty hands, and if the proposed rolling mill be started in connection with the chain works, it is estimated that the establishment will furnish employment to nearly one thousand workmen.

The Sharpville Advertiser says: The Shemango Furnaces, at West Middlesex, it is said, will blow out, if no decline in the price of ore takes place, as soon as they work up their present stock, which will be exhausted in a few weeks.

A manufactory for making emery wheels has lately been started in Weissport.

The Schuylkill Copper Smelting Works, near Phoenixville, are receiving copper ore from New Mexico, which is said to be very rich in quality, yielding about eighty per cent. of a very fine quality of metal.

The Lawrence Guardian says: The old Sophia Furnace of Messrs. Reis, Brown & Berger, in this city, was blown out last week, for repairs. She has been in full blast continuously for four years and nine months, and in that time turned out fifty-two thousand tons of pig iron. The Sophia is an open top, 13 feet in the boshes, 60 feet high, and was lined with Shemango fire brick. We understand it is the intention of Messrs. R. B. & B. to enlarge her to 15 feet bosh and change to a close top before putting her in blast again.

The furnace of the Millerstown Iron Company, in Lehigh county, will go into blast about the middle of this month. It has a capital stock of \$300,000, with the privilege of increasing to \$500,000.

Work has been begun on the Co-operative Rail Mill in Danville.

MISSOURI.

An Eastern company has purchased, for \$12,000, the iron lands of Mr. D. W. Gillman, in the northwestern part of Bollinger county. The tract consists of 247 acres, is four miles south of Marquand, and one-quarter of a mile east of the railroad. They intend erecting a furnace somewhere between Marquand and Bessville station.

The Missouri Hardware Company, with a capital of \$100,000, has been incorporated. The directors are John G. Murphy, E. W. Fox, Sol. G. Kitchen, Julius H. Pratt, Wm. C. Fox.

The proposition to establish an iron ship yard in St. Louis meets with a much stronger support than most people are aware of, and if its promoters, as we presume they will, push forward their enterprise without discouragement, the establishment of the yard will be only a question of a few months time. That there will be plenty of work for such a yard none need doubt. The coming river tonnage of the entire Mississippi Basin will be iron hulls, mainly for freighting purposes. Iron towboats and iron barges for the entire trade of the Mississippi, Missouri and the Illinois rivers will give abundant work for such a yard for some time. Ocean vessels with iron hulls may be constructed in St. Louis quite as cheap as elsewhere, as there will be a combination of cheap iron, cheap timber, cheap living, and as cheap labor as elsewhere in the country.—St. Louis Journal of Commerce.

Considerable enterprise is being manifested and capital invested in the development of the mineral region in Morgan county, a few miles south of Otterville, in Cooper county. David Cramer has found lead in paying quantities about five miles from Otterville, and several persons in the neighborhood are taking out from 300 to 700 pounds per day in that vicinity. Samuel Wear, Esq., from whom we derived our information, is sinking a shaft on land owned by him in that locality, with fine prospect of success. Old miners, who have been upon the grounds, say that they find every indication of large deposits of mineral.—Boonville Advertiser.

OHIO.

It is reported that two blast furnaces are to be erected during the coming year, about two and a half miles from Straitsville. They will be 48 feet high and 12 feet at the boshes.

After a long stoppage, the Globe Rolling Mill, Cincinnati, resumed operations on the 18th ult.

At Cleveland, all the mills and furnaces are in operation. The Cleveland furnace is now turning out forty tons daily, and has been in full operation all the season.

The Union Iron Works, Cleveland, are running full force and time, but orders are rather light and prices low.

The Cleveland Spring Company's business opened earlier than usual this season, and thus far orders have been good, though prices are ruling low. Under the prevailing state of affairs the business is considered satisfactory.

The Globe File Works, Cleveland, W. G. Palmer & Co., which went into operation last month, is running on a liberal supply of orders, and the "outlook" is very favorable. The firm are making an article equal to the best English manufacture.

The Union Screw Works, Cleveland, is more than fulfilling the most sanguine expectations of its founders. For the month past orders have kept steadily and largely ahead of production, and the company is now building new machinery to be added to that at present in operation for the purpose of keeping abreast with the demand. There is no more successful establishment in the country. They are now turning out 2000 gross per day, which will be increased to 3000 within three months.

The King Bridge Company, Cleveland, report their business good, comparing favorably

with a year ago. They are employing the full complement of men usual at this season, and expect to increase their working force at an early day.

ILLINOIS.

Several establishments for the manufacture of farm implements are in successful operation at Rockford. Emerson & Co., the largest house in this business, shipped, in 1873, nearly 200 car loads of agricultural goods, and employ some 150 workmen.

Stewart, Lewis & Co., of Plano, have just sent 300 Marsh harvesters to Russia. They were shipped via the Mediterranean Sea to Odessa.

KANSAS.

The first bar of railroad iron ever rolled in Kansas was made at the Topeka steel and iron works on the 24th of April. It is claimed that the company has a year's work engaged.

Work for the smelting of zinc and the manufacture of fire-brick and fire-clay retorts have been established at Cherokee. The capital invested came from Chicago.

MASSACHUSETTS.

At the Springfield Armory have been completed about 7000 muskets of the model of '73, and 7000 carbines; in all, one-half of the 28,000 muskets and carbines which are to be completed by the first of July. The forging for all is done.

The Wollaston Foundry Co., at Wollaston, has been in operation seven months, and is employing thirty men, with plenty of work. A 25-horse engine from the Essex Machine Co. furnishes the power.

The cotton seed planter factory, recently destroyed by fire at Wintrop, is to be rebuilt, and the proprietors, Messrs. Sturgis & Matthews, propose to renew their stock before the next planting season.

The National Needle Company, of Springfield, are working nights to keep pace with their orders.

NEW HAMPSHIRE.

The Amoskeag Steam Fire Engine Company, at Manchester, have just completed the largest machine of this kind ever built in this establishment. It has 9 1/2 inch cylinders, 5 inch pump, 8 inch stroke, and plays 4 streams. Its weight is about 5 tons, and cost not far from \$5000. It is intended for Mississippi Company No. 2, of New Orleans.

Lake Superior Furnace Notes.

The Marquette Mining Journal says:

The Carp River furnace made her first iron on Sunday last, and is now working to the most perfect satisfaction of the manager. She is, of course, blowing light, and it will be some time before she attains her maximum.

The Morgan went into blast on Thursday, after having received new boshes and lining, together with repairs to engines and hot blast. James Moore, who found his occupation gone, after the burning of the Champion, has been transferred to the Morgan, as founder, to take the place of Carroll, resigned. Mr. Donkersley gives the greater part of his time and attention to the furnace, and, report says, will reside there permanently.

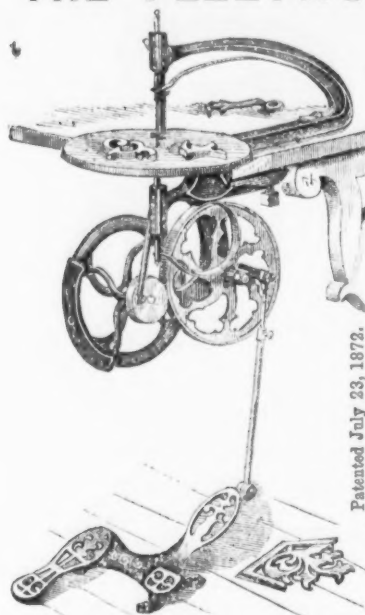
The Escanaba furnace went into blast last Wednesday under the most flattering auspices. Mr. Kirkpatrick, president of the company, has assumed the immediate superintendence of the affairs of both the furnace and the mines, to which he will devote the whole of his attention. P. H. Carroll Esq., late of the Morgan furnace, who can get more iron out of a charcoal stack than any man we know of, has been engaged as founder, and if the furnace has any business in her he will get it out. The company have an abundant supply of the very best hardwood coal, and will, hereafter, use only the best quality of Cascade (west end), Klamon and Rolling Mill hematite ores, with a view of making a brand of iron especially adapted for Bessemer steel.

Messrs. Kaufman & Co., of Lebanon, Pa., are pushing the erection of their Sheridan furnace. The two hot blast foundations are finished, and bricklaying commenced. Each oven will contain 10 double pipes, and be fitted with combustion chambers, and Welmer's patent gas burners. The stack will be 16 feet bosh, and 55 feet high, of brick, banded with wrought iron. The boilers are in "two nests," each nest containing three upper boilers 40 feet long, 42 inches in diameter; three lower boilers, 32 inches in diameter, by 35 feet long, and two mud drums, 36 inches in diameter, by 15 feet long. The upper boilers will be connected with the lower ones by seven pipes each 12 inches in diameter. A steam dome 30 inches in diameter and 30 inches high is to be secured to each top boiler. The heads of the upper boilers, and those for the rear end of the lower boilers will be cast of iron. The blowing engine will be vertical, and will measure 53 feet from the bottom of the fly-wheel to the top of the blowing cylinder. The blowing cylinder will measure 7 feet in diameter, stroke 7 feet. The steam cylinder will measure 4 feet in diameter, stroke 7 feet. The engine will weigh 150 tons.

The recent decision of Judge Lowrie of the Court of Quarter Sessions of Crawford county, Pennsylvania, in a suit brought by the proprietor of the Titusville Courier against members of the Titusville Printers' Union, is a most important one, as determining the limit at which the attacks of such unions must cease. The Union having differed on some point with the proprietor of the Courier, not only prevented its own members from working, but endeavored to prevent other printers from doing the work. The result was a trial for conspiracy and a conviction of the union men, against whom the charge was brought. Judge Lowrie, in summing up for the jury, presented the evil character of a union of the class described in words decidedly unmistakable, and the jury in the verdict given endorsed the judge's opinion. The lesson learned may prove a salutary one to the trades unions.

DEMAREST, JOYCE & CO.,
Iron Founders,
MACHINISTS,
and Manufacturers of
Sewing Machines,
Steam Fittings,
AND
LIGHT WORK of all kinds.
ALSO
Plain and Ornamental
Japanning.
20 to 30 Morton, and 57 to 65
Clymer Streets,
BROOKLYN, E. D., N. Y.

EAGLE IRON FOUNDRY.

THE FLEETWOOD SCROLL SAW.

Simple, Compact and Durable.
Runs easily as a Sewing Machine.
THE BEST OF ITS KIND, AT ONE-HALF THE COST OF ANY OTHER MAKE.
For Amateurs, Jewelers, Model Makers.
WILL MAKE BEAUTIFUL PARLOR ORNAMENTS, MONOGRAMS, METAL PATTERNS, ETC.
Will Saw Wood, Brass, Zinc, Copper, Horn, Bone and Ivory.
ADAPTED TO THE FINEST WORK.
No experience required to make beautiful Brackets, Picture Frames, Easels, Book Shelves, Match Boxes, etc., etc., which sell quickly at large profit.
The *American Agriculturist*, in speaking of this machine, says: "For pattern makers and other mechanics who need to do fine sawing this machine is admirably suited, while for those amateurs who wish to exercise their ingenuity in ornamental work we can conceive of nothing more compact and efficient. The whole may be attached to an ordinary table, and may be set up in a workshop or a sitting-room. To those who have patiently elaborated patterns by hand, this machine will be especially welcome, as it leaves both hands at liberty, and, while it insures greater accuracy, it does the work with greater rapidity. From what we have seen of the working of this saw, we think it will meet all the requirements of those in want of such a machine."
The editor of the *N. Y. Illustrated Christian Weekly*, in an article on Scroll Sawing, says: "The best thing for this sort of work is a treadle saw. I use what is known as the 'Fleetwood scroll saw,' and find it a most capital instrument for the purpose."
The machines are handsomely finished, very carefully fitted, and **WORK TRUE**. Will cut three-quarter inch wood readily, sawing 12 inches between saw and frame, and weigh complete 25 lbs.
No. 1 Machine, complete, at factory.....\$10
No. 2 Machine, improved, with iron table, veneered with walnut, clamps for the finest saws, wheel guard, double foot treadle, etc.....\$15
Foot treadle, etc.....\$15
Boxing 40 cents each.
Send for Circular and Catalogue of Designs.
Liberal terms to the trade.

TRUMP BROTHERS, Manufacturers, Wilmington, Del.

H. W. PEACE,

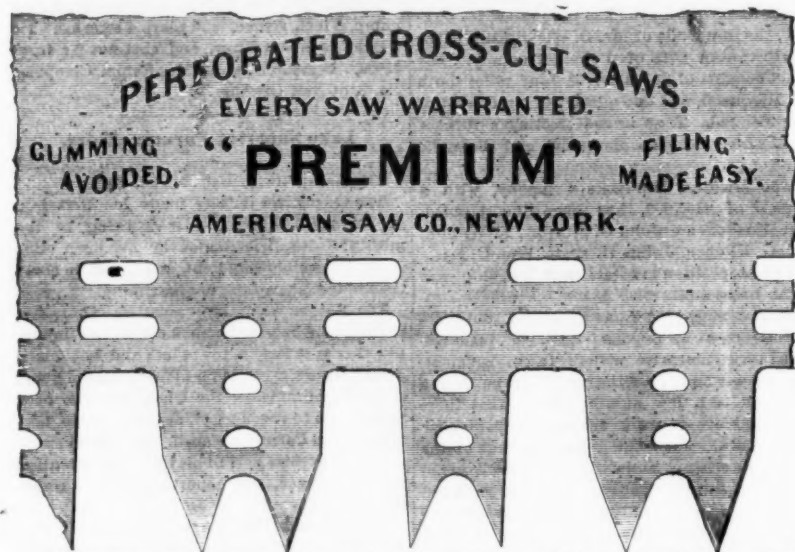
MANUFACTURER OF

SAWS OF ALL KINDS.

FACTORY, WILLIAMSBURG, N. Y.

AMERICAN SAW CO.,

TRENTON, NEW JERSEY.

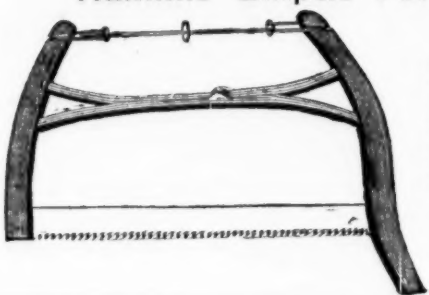


Solid saws require frequent gumming, thereby subjecting them to risk of springing or breaking. This is especially the case with cross cuts having *Patent Teeth*. In the perforated saws **all gumming is avoided**, and the teeth are easily kept long and in proper shape, saving *files, labor, expense and vexation*. As is well known, our saws cut faster, smoother and easier than any other.

MOVABLE-TOOTHED CIRCULAR SAWS AND SOLID SAWS OF ALL KINDS.

Hankins' Elliptic Forked Saw Frame.

Patented June 28th, 1870.



The annexed engraving represents HANKINS' ELLIPTIC FORKED SAW FRAME, which commends itself to the trade for its simplicity of construction. The Forked Brace being all in one piece, without any center bolt, secures for the frame great strength and durability. These Frames are put up with my best Webs, marked "No. 40, Harvey W. Peace."

HARVEY W. PEACE,
VULCAN SAW WORKS,
WILLIAMSBURG, N. Y.

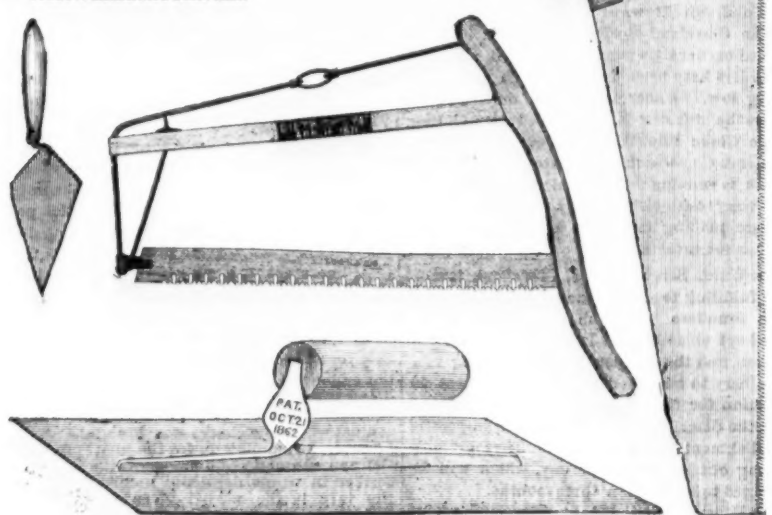
J. FLINT & CO.Manufacturers of all kinds of **SAWS and PLASTERING TROWELS.** ROCHESTER, N. Y.

Dietrich's Patent Wood Saw. Guaranteed the strongest, lightest, easiest to strain or tighten and best braced wood saw made; also to give perfect satisfaction.

Dietrich's Patent Double Handle Rip Saw. All will readily see the benefit of this useful invention.

J. Flint's Patent Plastering Trowels. The best made and finished Trowels in the world. We make four grades of Plastering Trowels, from the best to the cheapest.

Our patent method of grinding hand saws makes them superior to any in the market.
Send for Illustrated Price List.

**GEORGE GUEUTAL & SON,**

39 West 4th St., New York.

IMPORTER OF



Wood Screws, Steel in Sheets,

BAND SAWS, TOOLS FOR BRAZING, &c.

Bed Screws, Pin Hinges, and Wire Nails a Specialty.

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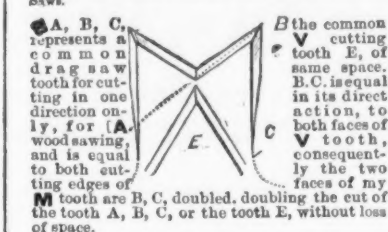
Manufacturer of

LIGHTNING SAWS.

A Challenge of \$500, toward expense of a public test, to prove that the Lightning Saws excel all others in Speed, Ease, and Simplicity, has been offered since 1870, and has never been accepted. More than 100,000 Lightning Saws were sold during the year 1872, the purchasers of which testify to their superior merits.

Our leading papers, such as the *Tribune*, *American Agriculturist*, *Christian Union*, etc., have published over sixty editorial notices recommending these Saws. Farmer's Clubs, Lumbermen, and Hardware Dealers unite in pronouncing the genuine Lightning Saw the greatest labor-saving implement of the age.

I have hundreds of letters from practical sawyers, voluntarily written, expressing their entire approval of these Saws.



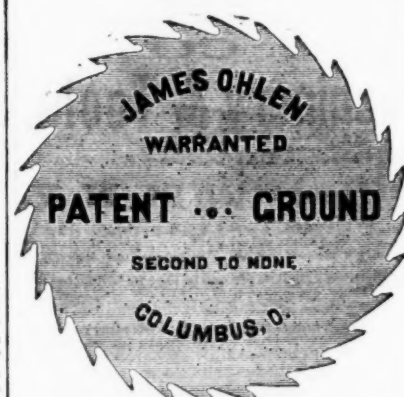
This is produced by dressing the two points of my **M** tooth, to cut in line so that the outside B, C, has four times the space of the slant edge behind it, or from 1 to 5, while slant has space from 1 to 2, the inefficient slant edges are thus practically concealed and do but slight surface cutting, while B, C, edges cut and clear simultaneously.

For Catalogue and additional information address.

E. M. BOYNTON, 80 Beekman Street, New York,
Sole Proprietor and Manufacturer.

N. Y. Saw Frame Co.

E. M. BOYNTON,
80 Beekman Street, New York,
SOLE AGENT.



I make a specialty of the **LARGEST SIZES of Circular Saws**, and call particular attention of lumber manufacturers to the following points of excellence: **Evenness of Temper.**—The peculiar structure of my furnace subjects all parts of the saw to a **DEAD** heat, and when dipped in the oil bath secures perfect uniformity.

Perfect Accuracy in Thickness.—My saws are ground on a patent machine, automatic in its operation, grinding off the thick places upon the plate before the thinner parts are reached, and when the saw is removed **BALANCES PERFECTLY**, which is proof positive of the right accomplishment of the work.

Properly Hammered.—Great care is taken that no saw shall leave my works without due attention to this important particular. A saw too tightly strained upon the rim, or too loose in the center, cannot be successfully run—hence the importance of no hammering the saw as to effect equal strain in all its parts, and at the same time **RUN TRUE**. This department is under the personal supervision of myself, who has devoted over *twenty* years to the art of saw making.

I am sole proprietor and manufacturer of the celebrated "**Challenge**" Cross-Cut saw. Price Lists of all kinds of saws sent on application.

JAMES OHLEN.**Rocky Mountain Vermilion Paint**

Is "Nature's Compound" of Copper, Mercury, Lead and Iron. A pure Oxide of Metals, containing no earthy matter, hence we claim and are prepared to prove that it is the **Best and Cheapest Paint** in the market. Properly mixed, we will guarantee it to cover double the surface and wear twice as long as ordinary paints. It will not Peel, Scale, Crack or Blister, though subjected to high degrees of heat. It will effectually prevent the Corrosion of Metals, even in mid ocean. Warranted superior to red lead or any other lead, for any and all purposes for which paint is required. Please send for circulars. All orders should be addressed, **Wm. H. Carey, General Agent, 23 Custom House St., Providence, R. I.**

WHEELER, MADDEN

&

CLEMSON,

Manufacturers of Warranted Cast Steel

SAWS

of every description, including

Circular, Shingle, Cross Cut,

Mill, Hand, Roberts' and

other Wood Saws,

&c., &c

Cast Steel Files

of the well known brand of

Wheeler, Madden & Clemson.

FACTORIES:

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BRANCH OFFICE:

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BRUNDAGE FORGED HORSE NAILS,

Manufactured from

BEST NORWAY IRON,by **BRUNDAGE & CO.** Sold by**WHEELER, MADDEN & CLEMSON**

Middletown, Orange Co., N. Y.

E. C. ATKINS & CO.,

Indianapolis, Indiana,

Saw Manufacturers.

Best Cast Steel Patent Ground Saws

Also, sole Manufacturers of Atkins' Patent

**CROSS-CUT SAW HANDLE.**

Best Patent Handle in use.

Manufactory and Office—Nos. 210, 212, 214 and

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WM. McNIECE,**Excelsior Saw Works.**

515 Cherry St., Philadelphia.

Manufacturer of

Extra Cast Steel Saws of every description.

Pat. Screw Socket Pole Pruning Saws,

Patent Screw Socket Edging Knives,

Patent Screw Socket Scuffle Hoes, and

Patent Screw Socket Paper Hang-

ers' Scrapers,

Mowing Machine Sections of all patterns

constantly on hand.

Schweitzer Mfg. Co.,

57 Reade Street, New York.

**CONTINENTAL LOCKS**

Made of Wrought Iron or Brass, very superior in quality, and only an auger used in mortising.

SCHWEITZER PAD LOCKS,**EXCELSIOR COMPASSES,****EXCELSIOR DIVIDERS,**

WITH

STUBS' STEEL POINTS,

Best and Cheapest Goods in the market. Sole Agents

for the United States for

NEWBOULD'S FILES AND TOOLS**French Coffee Mills.****NOBLE MFG. CO.,** Tools, Ship Augers, &c.**Emery, Waterhouse & Co.,** Shovels & Spades

We also make a superior

AXE, "Queen of the Forest," &c.**Diston's Saws.** (Largest "lock in the City). General dealers in**FOREIGN & DOMESTIC HARDWARE.****Cutlery.**

ESTABLISHED 1852.

NEW YORK KNIFE CO.

MANUFACTURERS OF SUPERIOR

Table & Pocket Cutlery,

WARRANTED TO BE MADE OF THE BEST MATERIAL.

WALKILL RIVER WORKS,

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THOS. J. BRADLEY, President.

**Wood's Hot Water-Proof Table Cutlery.**

Handsome, Cheapest, most Durable Cutlery in use.

Wood's Celebrated Shoe Knives. Butcher

Knives a specialty.

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SPECIALTIES:

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Hardware Commission Merchants,

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At each of these places a complete assortment of sam-

ples of Hardware and Fancy Goods will be found, in-

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John Himmer & Son's Celebrated**Harness and other Needles.****OSCAR IRVING VAN WART & Co.,**

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GENERAL**Hardware Merchants,****BIRMINGHAM, - ENGLAND.**

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Landers, Frary & Clark,

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MANUFACTURERS OF

TABLE CUTLERY

OF EVERY DESCRIPTION. ALSO.

General Hardware,

IN VERY GREAT VARIETY.

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PETERS BROTHERS,

AWARDED THE MEDAL OF MERIT.

LARGE STOCK OF

VIENNA, 1873.



American, German, English

Pen, Pocket & Com-
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Scissors, Scissor Cases,

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Heinrich Tailor Shears, &c.,

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HENRY DICKINSON,

Sheffield Cutlery, Files, &c.,

66 & 68 READE STREET (near Broadway), NEW YORK.

Manufactured, SHEFFIELD, ENGLAND.

Isaac Milner's Fine Pocket and Table Cutlery.

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Milner's "X" and Collins' "IXL" Hand Saws.

Elmira Nobles Mfg. Co.,

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"WATROUS" SHIP & CARPENTERS' AUGERS,
Adjustable Handled Drawing Knives, Axes, &c.

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MANUFACTURERS OF

Pen and Pocket Cutlery, Solid Steel Scissors, F. & L. Shears, Razors,
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Sole Proprietors of the renowned full concave patent

"ELECTRIC RAZORS."

Also Agents for the BENCALL RAZORS.

American Table Cutlery, Butcher Knives, &c.

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THE MILLER BROTHERS CUTLERY CO.,

Manufacturers of

PATENT FINE PEN & POCKET CUTLERY
WEST MERIDEN, CONN.

The only knives made that are put together in such a manner that there is no strain on the con-
vex or flat part of the blade. We warrant our knives equal in cutting qualities and workmanship to any
made, and are acknowledged by English makers as the Best American Knife. We also make

NICKEL & SILVER PLATED POCKET KNIVES

which will not rust or become discolored when used as a Fruit Knife, and their cutting qualities are equal
to any other knife. Orders filled from the factory or by

J. CLARK WILSON & CO., 81 Beekman Street, N. Y.

JOSEPH S. FISHER,

No. 411 Commerce St., PHILADELPHIA,

AGENT FOR

George Wostenholm & Son,

Washington Works, SHEFFIELD,

Celebrated I-XL Cutlery, Razors, &c.

AGENT FOR

WALTER SPENCER & CO.,

Steel and File Manufacturers,

Rotherham, ENGLAND.

Corporate Mark.

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ROTHERHAM

Granted 1777

RICHARD A. TURNER,

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Agent for

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Hardware Commission Merchant,

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AMERICAN

PEN AND POCKET KNIVES,

MANUFACTURED BY

PEPPERELL,

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My Blades are forged from the best Cast Steel, and

warranted. To me was awarded the GOLD MEDAL of

the Connecticut State Agricultural Society, also a Medal

and Diploma from the Mass. Mechanics' Ass'n, Sept., 1860.

CORPORATE MARK,



Joseph Rodgers & Sons'

(LIMITED)

CELEBRATED CUTLERY,

No. 82 Chambers Street, New York.

CHARLES PEACE, JR., Agent.

The demand for Joseph Rodgers & Sons' productions having considerably increased, they have, in order to meet it, greatly extended their Manufacturing Premises and Steam Power.

To distinguish Articles of Joseph Rodgers & Sons' Manufacture, please to see that they bear their Corporate Mark.

Notice of Removal.

ASLINE WARD,

From 54 Beekman St. to No. 101 and 103 Duane St., N. Y.

REPRESENTING

GEO. WOSTENHOLM & SON

CUTLERY AND RAZORS,

WASHINGTON WORKS, SHEFFIELD.

CORPORATE MARK.

I-XL

FRED'K WARD & CO., SHEFFIELD,

CUTLERY & TABLE KNIVES,

CORPORATE MARK.

B4*ANY

The Novelty Lawn Mower.

The accompanying illustration gives a good idea of this comparatively new machine, the principle of which will be generally understood when we say that it is in practice simply a common field mower, adapted, however, to hand power. As the power is applied in the center of the cutter bar, any side draft is avoided, and as the application of power is made by the crank, the roller does not require to be made heavy for traction purposes, for which reason a wooden roller is used, or its place may be supplied by two light wheels. The average weight is thus reduced to about twenty pounds, as is also the cost of manufacture to a great extent.

It may be run against a stone, stump, tree or other obstruction not large enough to pass between the fingers of the cutter bar and the machine, although stopped in its motion forward, may still be worked, as the knife sections are one-fourth an inch shorter than the guard fingers, thus enabling the grass to be cut close to the tree, as is also true of borders, hedgerows, etc. In fact, it is claimed by the manufacturers that it will cut wherever required around plants, thus doing away with the necessity of using the shears and sickle.

The advantages claimed for it by the manufacturers, Messrs. Geo. Dwight & Co., of Springfield, Mass., are principally as follows: Cutting grass of any desired height, trimming close to trees, plants, fences, etc., less weight, consequently requiring less power, enabling it to be run by a person of moderate physical abilities, and last, though not least, less cost of manufacture.

Japans for Metal Surfaces.

Japanning is the art of covering bodies by grounds of opaque colors in varnish, which may be afterward decorated by printing or gilding, or left plain.

All surfaces to be japanned must be perfectly clean.

The French prime all their japanned articles, the English do not. This priming is generally a common size. Articles thus primed do not endure as well as those that receive the japan coating without priming.

A solution of strong isinglass size and honey, or sugar candy, makes a good japan varnish to cover water colors on gold grounds.

A pure white priming for japanning, for the cheap method, is made with parchment size and one-third of isinglass laid on very thin and smooth. It is the better for three coats, and when the last coat is dry, it is prepared to receive the painting or figures.

Previous to the last coat, however, the work should be smoothly polished. When a surface is to be japanned, without priming, the best plan is to lay on two or three coats of varnish made of seed-lac and resin, two ounces each, dissolved in alcohol and strained through a cloth. This varnish should, if possible, be warm also, and all dampness should be avoided, to prevent the varnish from being chilled. When the work is prepared with the above composition and dry, it is fit for the proper japan to be laid on. If the ground is not to be white the best varnish now to be used is made of shellac, as it is the best vehicle for all kinds of colors. This is made in the proportions of the best shellac, five ounces, made into powder, steeped in a quart of alcohol, and kept at a gentle heat for two or three days and shaken frequently, after which the solution must be filtered through a flannel bag, and kept in a well corked bottle for use. This varnish for hard japanning on copper or tin will stand for ever, unless fire or the hammer be used to burn or chip it off.

The color to be used with shellac varnish may be of any pigments that will give the desired shade, as this varnish will mix with any color.

WHITE JAPAN GROUND.

To form a hard, perfect white ground is no easy matter, as the substances which are generally used to make the japan hard, have a tendency, by a number of coats, to lose their brightness. One white ground is made by the following composition: White flake of lead, washed over and ground up with a sixth of its weight of starch, then dried and mixed with the finest gum, ground up in parts of one ounce gum to half an ounce of rectified turpentine, mixed and ground thoroughly together. This is to be finely laid on the article to be japanned, dried, and then varnished with five or six coats of the following: Two ounces of the whitest seed-lac to three ounces gum anima reduced to a fine powder and dissolved in a quart of alcohol. This lac must be carefully picked. For a softer varnish than this a little turpentine should be added, and less of the gum. A very good varnish, and not brittle, may be made by dissolving gum anima in nut oil, boiling it gently as the gum is added, and giving the oil as much gum as it will take up. The ground of white varnish may be made of this varnish by giving two or three coats of it, but when used it should be diluted with pure turpentine. Although this varnish is not brittle, it is liable to be indented by strokes, and it will not bear to be polished, but if well laid on it will not need polishing afterward. It also takes some time to dry. Heat applied to all oils, however, darkens their color, and oil varnishes for white grow very yellow if not exposed to a full, clear light.

GUM COPAL.

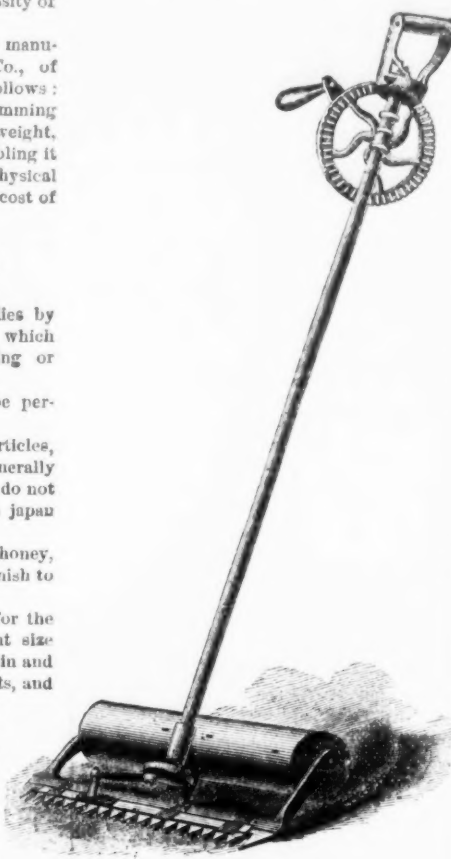
Copal varnish is one of the very finest varnishes for japanning purposes. It can be dissolved by linseed oil, rendered dry by adding some quicklime at a heat somewhat less than will boil or decompose the oil by it.

This solution, with the addition of a little turpentine, forms a very transparent varnish, which, when properly applied and slowly dried,

is very hard and durable. This varnish is applied to tea boards and other utensils. It also preserves paintings, and renders their surfaces capable of reflecting light more uniformly.

If powdered copal be mixed in a mortar with camphor it softens and becomes a coherent mass, and if camphor be added to alcohol it becomes an excellent solvent of copal by adding the copal, well ground, and employing a tolerable degree of heat, having the vessel well corked, which must have a long neck to allow for expansion, and the vessel must only be about one-fourth filled with the mixture. Copal can also be incorporated with turpentine, with one part of powdered copal to twelve parts of pure turpentine, subjected to the heat of a sand-bath for several days in a long necked vessel, shaking it frequently.

Copal is a good varnish for metals, such as tin. The varnish must be dried in an oven, each coat, and it can be colored with some substances, but alcohol varnish will mix with any coloring matter. For white japans or varnishes we have already shown that fine chalk or white lead was used as a basis, and the varnishes coated over it.



THE NOVELTY LAWN MOWER.

BLACK GROUNDS.

Black grounds for japans may be made by mixing ivory black with shellac varnish; or for coarse work, lamp black and the top coating of common seed-lac varnish. A common black japan may be made by painting a piece of work with drying oil (oil mixed with lead), and putting the work into a stove, not too hot, but of such a degree, gradually raising the heat and keeping it up for a long time, as not burn the oil and make it blister. This process makes very fair japan and requires no polishing.

BLACK JAPAN.

1. Naples asphaltum, fifty pounds; dark gum-anima, eight pounds, fuse; add linseed oil twelve gallons, boil; add dark gum amber ten pounds, previously fused and boiled with linseed oil, two gallons; add the driers, and proceed as last. Used for wood or metals.

2. Asphaltum three ounces, boiled oil four quarts, burnt amber eight ounces. Mix by heat, and when cooling thin with turpentine.

3. Amber twelve ounces, asphaltum two ounces, fuse by heat; add boiling oil half a pint, resin two ounces; when cooling add sixteen ounces oil of turpentine. Both are used to varnish metals.

BRUNSWICK BLACK.

1. Foreign asphaltum forty-five pounds, drying oil six gallons, litharge six pounds, boil as last, and thin with twenty-five gallons of oil of turpentine. Used for iron work, &c.

2. Black pitch and gas tar asphaltum, of each twenty-five pounds, boil gently for five hours, then add linseed oil eight gallons, litharge and red lead, of each ten pounds, boil as before, and thin with oil of turpentine twenty gallons, inferior to the last, but cheaper.

(To be continued.)

Suicide by Leaping into a Blast Furnace.

—The Scranton (Pa.) Republican says that shortly before 1 o'clock Friday morning, the men working on the night shift at the blast furnace of the Lackawanna Iron and Coal Company, were horrified by one of the most shocking cases of self-destruction that has ever occurred in that city. The victim was a young man named Theodore Marone, who took advantage of the temporary absence of the workman, and plunged into the seething furnace, which, at the time, was at a white heat. His cries attracted attention, and the workmen ran to the furnace and looked down, only to see the unfortunate Marone, waving his hands and feet in the most intense agony. A long handled shovel was lowered to him, but he was unconscious of its presence. One of the men ran immediately and stopped the blast, but human aid was of no avail to save the unfortunate man in the furnace, and he was dragged up as quickly as possible, by means of a large hook, a charred, disfigured, and unrecognizable mass. He could not have been in the furnace above a few minutes, but the intense heat was sufficient to destroy life if he had not been there more than a second.

The Hanging Rock Region.

The following correspondence will be read with interest:

WELLSTON, JACKSON CO., O.,

April 8, 1874.

Prof. E. B. Andrews—DEAR SIR:—In consequence of your visits to this place with Messrs. Rhodes, Pettigill, Seaton and Carr, of the city of Cleveland, Ohio, for the purpose of making an examination of the recent discoveries made in coal and iron ores in and about this place, I respectfully request that you furnish me with a written report of the result of your investigations. I am, as ever,

Respectfully yours,

S. N. YEOMAN,

President Wellston Coal and Iron Co.

LANCASTER, O., April 10, 1874.

Hon. S. N. Yeoman—DEAR SIR:—At your request I furnish you some of the more important facts relative to the mineral value of your land in the immediate vicinity of Wellston, Jackson county, Ohio, with a statement of the advantages of the location for iron manufacture.

The property is near the western edge of the Ohio coal field, directly on the Portsmouth branch of the Marietta & Cincinnati Railroad, about two miles below the junction with the main line at Hamden. The latter place is reported to be 128 miles from Cincinnati. By the branch railroads direct communication is secured with the Ohio River.

Your land is within the range of a seam of coal which I have called in the Ohio Geological Reports the "Anthony" seam. This is found under a considerable area on both sides of the railroad, and is known to extend westward with the valley of Pigeon Creek, where it is found above the bed of the stream. The coal of this seam, taken as a whole, is, I think, the purest found in the State. The State chemist, Prof. Wormley, has analyzed eighteen samples of this coal, taken from this portion of Jackson county, with the following result:

Water	6.877
Ash	2.312
Volatiles combustible matter	29.946
Fixed carbon	60.860
	100

Sulphur left in coke, 0.74

Per cent. of sulphur in coke, 0.283

Gas in cubic feet per lb. of coal, 3.43

In some samples the ash was less than 1 per cent. (0.85 and 0.77) and in one the fixed carbon was over 65 per cent.

The coal is very dry burning and shows no tendency to cement or swell when heated, and is consequently adapted, in the raw state, to the blast furnace. The heating power is large, and the ash very small. The average sulphur is small. In properly constructed furnaces it cannot fail to be a superior coal for iron making. It has been tried in one of the Jackson stone-coal furnaces with results so good as to induce parties experienced in the stone coal furnace business at Jackson to build the Milton furnace for the exclusive use of this coal. This furnace is now nearly completed. It is probably not more than half a mile from the Lasley farm. I have no doubt of the success of the Milton furnace.

The principal seam of coal is something over four feet thick. At the Wellston shaft, almost within a stone's throw of the Lasley farm, I measured the seam and found it to be 4 ft. 3 3/4 in. There is no slate or clay parting, and the coal is very pure and homogeneous in character from top to bottom. It appears everywhere to be very evenly and regularly bedded, and free from the difficulties which afflict the Jackson shaft coal and the Briar Hill coal in Mahoning and Trumbull counties. The seam at the Wellston shaft is about 50 feet below the surface of the valley. At the Milton furnace shaft it is 70 feet below. Probably in the valleys it may be reached almost anywhere at depths no greater than these. There are traces of other seams of coal, but none were sufficiently opened for examination. The Jackson shaft coal seam should be found below the Anthony seam, but it is often wanting. I have no reason to doubt the general certainty of the Anthony seam under your property. There are two shafts in the immediate neighborhood, and numerous trial wells have been put down on the farm and vicinity, all of which are creditably reported to have found the coal in good development.

IRON ORES.

These lands are in the great ore belt of Northern Ohio, and contains the same class of ore used in the Hanging Rock district with so much acceptance to the iron trade and profit from the furnacemen. The ore are chiefly hematites or hydrated sesquioxides of iron. The most famous is the so called "limestone ore," from its resting on a well known stratum of limestone. The average metallic value of this ore, as given in Prof. Wormley's analyses, is 51.660 per cent. of iron. In the furnaces the practical yield is 49 per cent. With selected ores, or ores free from dirt and not wet, the yield is larger. The "black ore," yield to the chemist 45 per cent. of metallic iron. This is the average for all this iron belt. As there is less loss from the wagon to the tunnel head from the black ore, the material yield from the good black is scarcely less than that of the limestone ore. On the hills to the West of your lands are excellent block and kidney ores, and on the East the ore belt extends for many miles (of its width) and the quantity of ore is practically inexhaustible. It is in all the hills in layers from six inches thick to several feet, the latter being somewhat exceptional. Twelve to eighteen inches of thickness are not uncommon. The cost of the ore is chiefly the digging. If a furnace company owns its ore lands and builds a tram road from the ore banks to the furnace the cost of ore will be very small. I have seen an itemized statement of the cost of the ore delivered at the Lattrobe Furnace for the year 1873, which shows an average total cost of \$2.71 per ton. As the digging was paid for chiefly in goods from the furnace store, on which was a large profit, the actual cost was considerable less.

The cost of limestone will be small, as the "limestone ore" rests upon limestone, and they can be brought to the furnace by the same tramway. The cost of the coal is simply the cost of the mining and expense of the bank. I need not give detailed figures, but I think I am within the limits of safety in saying that a ton of iron would cost a properly equipped company less than the cost of the ore for a ton of iron at Youngstown, Pittsburgh, &c., and since the market price of iron is determined by the cost at the leading centers of manufacture, you will always have a margin of profit. If you should make a foundry iron the profit will be greater. At times when iron is high you would make an enormous profit.

The location is also a favorable one for rolling mills, and indeed for all manufactures into which cheap fuel and cheap iron enters as essential elements. The location is favorable, also, for the shipments of coal to the markets West—to Cincinnati, &c.

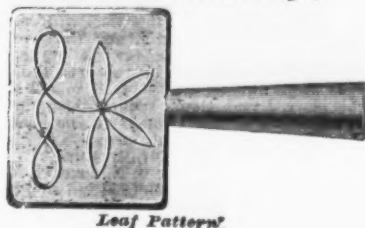
I should add that a railroad is projected from Columbus to the Ohio River, which is to pass through or near your lands. Beside the general advantages of competition, the road will pass through ore districts of the highest value, so that with such a road the supply of very cheap ore will be assured for an indefinite time to come.

Very truly yours,

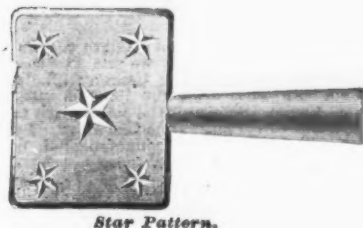
E. B. ANDREWS,

H. D. SMITH & CO., PLANTSVILLE, CONN.

Patent Embossed Steps.



Leaf Pattern.



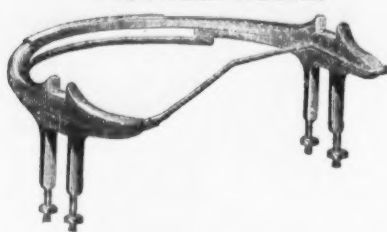
Star Pattern.

King Bolt Yokes.

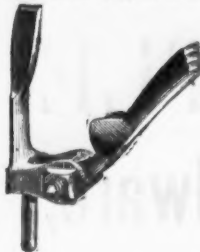


Established 1850.

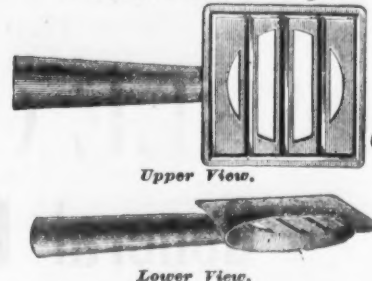
No. 6 Fifth Wheels.



1871 Pattern Shaft Couplings.



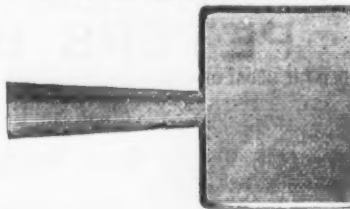
Patent Cross Bar Steps.



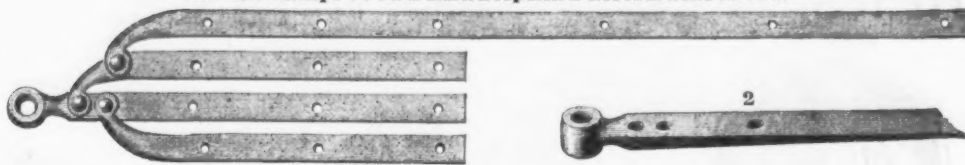
Upper View.

Lower View.

Solid Plain Pattern Steps.



Smith's Improved Philadelphia Pattern Slat Irons.

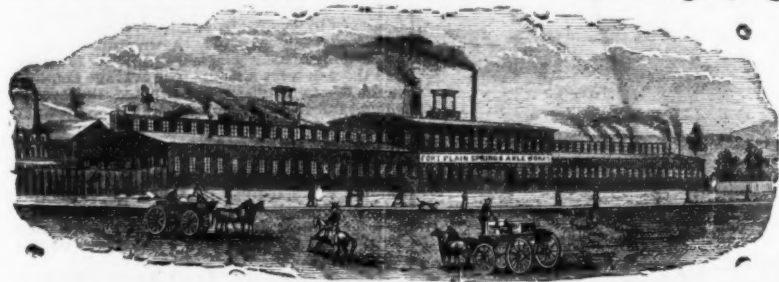


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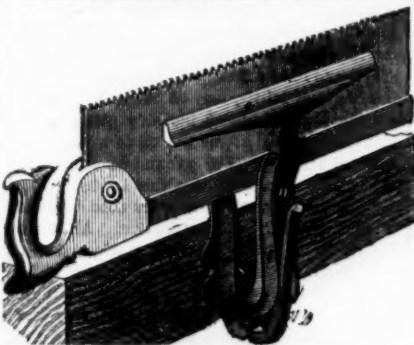
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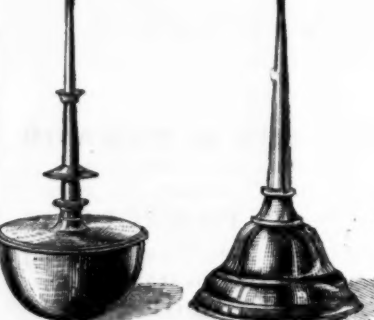
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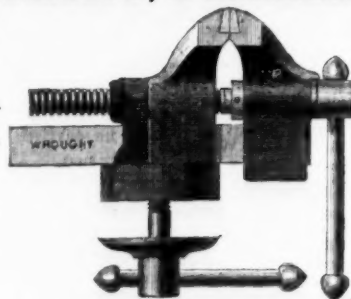


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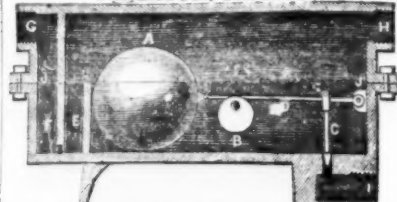
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New York, Thursday, May 14, 1874.

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JAMES C. BAYLES Editor.
JOHN S. KING Business Manager.

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Twenty-fifth Page.—Chicago, Boston, and St. Louis Hardware and Metal Prices.

The State of the Iron Trade Abroad.

While we are lamenting the phenomenal dullness of the iron trade of the United States, and wondering—there being no longer any basis for calculation—when we shall see evidences of improvement, it may be interesting to inquire how matters stand as regards the iron trade of other countries. Those who assign the present stagnation in iron to local causes only, and who believe that we have brought our troubles upon ourselves by a reckless speculation on the one hand and reckless overproduction of pig iron, to supply a fictitious and transient demand, on the other, seem to be ignorant or forgetful of the fact that the reaction from extreme industrial activity and material progress was not confined to the United States alone, but that it occurred simultaneously in nearly every country of the world. Nations are now so closely united by the bonds of commercial intercourse and intercommunication, and are to so great an extent interdependent, that causes which unfavorably affect one measurably affect all. This interdependence is seen in the course of the world's trade in every commodity of universal utility, and notably in the iron trade during the past three years. In 1871 the stimulus to iron production and iron consumption was felt in every country of the world. Railroads were built in all directions, great enterprises were freely undertaken, the price of iron advanced rapidly in all markets, England seemed to have reached the limit of her capacity to supply the wants of other countries, and iron manufacture was enormously stimulated in all countries producing iron to any extent. Every wheel of the world's commercial system moved in sympathy, as it were, with the forward swing of a great pendulum. When

this pendulum had swung to the limit of its beat, there was a sudden and universal pause; when it began to traverse backward, there was a universal reaction. The danger of an iron famine gave place to the danger of an overproduction; the rapid material development in countries and sections newly opened to civilization was suddenly checked. Railroad building was temporarily suspended in this country and to a less extent in Europe, Asia and South America; iron suddenly declined in value in all markets, and the panic which began here threatened to extend until its lessening ripples broke upon the furthest bounds of civilization. Had it been a sweeping commercial panic here it would have been felt very seriously abroad; as it was, it was felt only slightly, though appreciably, across the ocean. Had we not had a panic, however, our iron trade would have moved in sympathy with that of other countries, and a temporary reaction from the extreme activity and abnormal prosperity of 1872-3 was inevitable. It might have been less marked, and it certainly would have been less sudden, but we should have felt it. When the pendulum, which seems to have traversed to the limit of its beat in the direction in which it has moved since last summer, shall swing back again, we shall witness a general improvement and shall share in it to an extent proportionate to our ability to produce iron in profitable competition with British makers, who still look hopefully to this market as an outlet for some part of their large product; and, ultimately, in competition with them for the supplying of other markets than our own.

To learn how general is the stagnation in the iron trade from which we are now suffering, we need but glance at late files of British and Continental trade journals. In Great Britain matters are even worse than they are here, for while it is feared that many small concerns in this country will have to go into bankruptcy if there is not an improvement soon, the British market has been thrown into a panic by the number of failures reported of late. So far, all but a few of the great joint stock companies have tided over the difficulties which beset them on every side, but how long they will be able to meet their liabilities is a question which no one will venture to answer. The shares of many of the largest and most seemingly prosperous companies are quoted at a heavy discount. The *Financier*, a very good authority upon all subjects of commercial and financial interest, says:

If we turn to the statistics relating to the trade done during the last quarter, we shall find how utterly delusive must have been the hopes held out at the beginning of the year that the "turn" would see a revival of trade; and it will be remembered that, at the time, we endeavored to show that these anticipations had no real foundation. The total exports of steel and iron during the first quarter of the current year were 493,553 tons, against 669,563 tons in the same period of the previous year, showing a falling off of 176,000 tons. The total decrease in the quantity of pig iron alone exported was over 140,000 tons, the figures being—for the first quarter of this, 141,768; and for the same time of last year, 281,961. The United States is not alone to blame for this. Germany has taken 26,000 tons less; Holland, 45,000; Belgium, 24,000; France, 15,000; the United States, 13,500; British America, 1812; and "other countries" nearly 12,000 tons less. So that it will be seen the falling off in the trade has been very general, and by no means confined to any particular market. There is also a very marked decline in our exports of finished iron. Of bar, angle, bolt and rod, for instance, we have exported 12,000 tons less—viz., 54,064 tons, against 66,781 tons in the first quarter of 1873.

Our latest mail advices, under date of May 2d, are as follows:

The iron trade of these kingdoms is going from bad to worse. How much worse may be inferred from the fact that there is hardly an iron merchant in Liverpool who has upon his books orders for any iron whatever, notwithstanding that for some time past no iron has been shipped from that port, and from the further fact that we could name half a dozen first-class men of business, who represent leading wealthy pig iron makers in different parts of the kingdom, who, neither at the Wolverhampton nor the Birmingham quarterly meetings, booked an order for a single ton of iron. Such facts are altogether without precedent. This emergency is being met by ironmasters who are solvent continuing to blow out and damp down furnaces, lay off forges and mills, and call up their miners; and those who are not solvent are selling at a loss, to the future benefit of—the lawyers; whilst all are taking action with the view of bringing down wages. Prices so low as those which now rule in Scotland have not been known for three years, and it is to be assumed never before when the production has been, as now, nearly at a standstill.

On the Continent there is but little activity in iron manufacture or the iron trade. The Belgian makers are depending chiefly upon England for large orders, which can only be obtained at prices so low that the British makers cannot compete for them. The Belgian makers are very far from enjoying average prosperity, and a very large percentage of the furnaces of that country are out of blast. In France the iron trade is very much depressed, with no hope of improvement, except such as rests upon the undertaking of the 550 miles of railroad lately decreed by the National Assembly. Recent advices from Germany report a slight improvement in the iron trade in anticipation of the undertaking of certain important internal improvements. From nowhere, however,

do we hear of average prosperity in the iron trade, and from present appearances the recovery is likely to begin on this side of the ocean.

The Centennial.

It would be useless to conceal the fact that the friends of the Centennial Exposition have sustained a defeat in Congress, from which it will be difficult for them to rally. The bill appropriating \$3,000,000 in aid to the enterprise has been refused a third reading, and the matter is again in the hands of the committee for reconsideration. Whether the committee will be able to frame a bill that will meet the views of both houses of Congress, and at the same time render substantial aid to the enterprise, is a question which the most sanguine would scarcely venture to answer in the affirmative. Some will vote for an appropriation in aid of an international exhibition only, believing that the nation is committed to make the exhibition international by act of Congress and executive proclamation; some will vote an appropriation only for a national exposition, from which foreign exhibits are excluded; some are willing to recognize it, provided no appropriation is wanted; and some will oppose it unrelentingly in whatever shape it may be presented. To reconcile these differences is a task not easy of accomplishment, and as matters now stand it must be confessed that prospect of securing any aid from Congress is, at best, doubtful.

Should the session pass without any favorable legislation concerning the Centennial, the friends of that enterprise will have a choice of alternatives presented to them: they can either abandon it in disgust, or proceed with the work with what funds they have, in hand and pledged, trusting to the patriotism of the people, and the more favorable disposition of the next Congress to help them out. In our judgment, the latter course would be the wiser and more honorable of the two, and the more satisfactory in the end. As soon as the nation sees that Pennsylvania has put her shoulder to the wheel with a determination to make the Centennial a credit to the nation, whether the people of the other States come to her assistance or not, we shall have a reversion in public sentiment in favor of the enterprise. Private subscriptions will be more liberal as the work goes on, Congress will feel more like making an appropriation next winter than it does this spring, the party in power will see the necessity for doing something to clear itself, before the next Presidential canvass, of the odium which would attach to it from allowing the nation to be disgraced by the failure of the enterprise at this stage of its progress, the difficulties in the way of the undertaking will have become less formidable, because better understood, and its chances of complete success altogether better than they now appear. But for the panic and its attendant evils, Congress would not have been asked to aid the enterprise, and as the anniversary which the great Exposition is intended to commemorate draws near, interest will develop into enthusiasm, indifference into interest, and active opposition into passive indifference.

These are the alternatives, and the choice must be made quickly. If the Exposition is to be held, the work of erecting the buildings must begin at once; if not, let us waste no more time nor money upon it. To adopt either course involves a grave responsibility, which those must assume who are called upon to make the choice; but, in our judgment, to go on is less dangerous than to go back. If the Centennial is pushed forward to the limit of present resources of cash and credit, we believe it will be carried through to a final success by the people and government of the country; if abandoned, nothing we can do will wipe out the disgrace of failure, and the United States will stand before the world as a boastful young nation, which promised more than it could perform, and which began to build its tower without counting the cost. It is idle to say that the Centennial is a local affair, and that its failure will bring discredit only upon Philadelphia and Pennsylvania. There is more interest felt to-day in its success throughout Europe, than is felt in this country one hundred miles from Fairmount Park in any direction, and its failure will be a national disgrace and humiliation, whether we think so or not. Since writing the above, we have received the following official announcement:

It is respectfully announced, in order to remove any doubt which may possibly have arisen on the subject, that the work essential to the due celebration of the Centennial Anniversary by an International Exhibition in 1876 has been commenced, and will be prosecuted without any delay.
JOHN WELSH, President,
United States Centennial Board of Finance.
JOSEPH R. HAWLEY, President,
United States Centennial Commission.

A better answer could not have been given to those who have opposed the scheme. We print our remarks as they

were written, seeing nothing in the manly declaration of Messrs. Welsh and Hawley to cause us to change our words or opinions.

How Long Does An Offer to Sell, without Expressed Limitation, Remain Good?

A correspondent sends us the following letter of inquiry, which raises a question of general interest to all classes of our readers:

Boston, May 9, 1874.

To the Editor of *The Iron Age*: Having been much interested in the case of Geo. D. Hall vs. Hall, Kimbark & Co., as contained in your issue of 7th inst., I would ask the following question: Does not the dating of a letter or circular place a limitation upon the continuance of prices named therein, nothing to the contrary being stated, inasmuch as no guarantee is given beyond such date?

A reply will oblige, yours, respectfully,

SUBSCRIBER.

As we understand the question, it is: Does the date of a letter or circular limit the responsibility of the sender to fill, at the prices quoted, such orders as he may receive from those to whom his letters or circulars are sent, when there is nothing in the circular or letter indicating the length of time during which the offer holds good. So far as we can learn from our examination of the authorities, a specific offer to sell, without limitation as to date, is good for whatever the court, in the event of suit, may consider a "reasonable time." It has been several times affirmed that the person receiving such an offer may accept it at his convenience, and is not bound to reply by return mail, or by telegram, upon receipt of offer. The date of a letter or circular is only useful as showing at what time it was written or sent. The person to whom it is sent cannot be expected to receive it in every case upon the day indicated in such date, and it does not concern him to know whether it has been twelve hours or twelve days in reaching him, so long as it has experienced no unusual delays in transmission. The law supposes a man to mean whatever he puts his name to, whether it be a letter or a circular, and if an offer to sell is without expressed limitation as to time, the person receiving such an offer may accept it at his convenience. For example, Messrs. Brown & Jones, hardware merchants of New York, send a letter or circular to the following effect to Messrs. Smith & Robinson, of Chicago:

NEW YORK, May 13, 1874.
MESSRS. SMITH & ROBINSON, Chicago, Ill.

Gentlemen:—We are selling Crimp's patent fluting machines at \$5, net, cash within 15 days from receipt of invoice; and should be happy to fill an order from you at that price.

Respectfully,

BROWN & JONES.

In such a case as this, it is obvious that the date of the letter places no limitation upon the length of time for which the offer is good, since Messrs. Smith & Robinson cannot receive it before May 15th. Should they reply at their convenience, say within a week or ten days, we think Messrs. Brown & Jones would be legally bound to fill the order, unless they could show that it was for an unreasonable quantity. We do not think the fact that the market price of Crimp's patent fluting machines had advanced to \$6.50 during the interval between the date of Messrs. Brown & Jones's offer and Messrs. Smith & Robinson's order, would be accepted as a valid excuse for the non-fulfillment of their contract on the part of the former, provided the latter should insist upon it. If it was an unusually low price—the temporary result, perhaps, of a sharp competition between the makers and agents of rival fluting machines—prudence would have suggested the insertion of a qualifying clause in the letter or circular, such as: "We should be happy to fill an order from you at that price, if received within five days from date," which would give Messrs. Smith & Robinson time to send an order by telegraph if they wanted the goods. It is probable the Courts would rule that an order received subsequent to the expiration of the limitation did not constitute a contract.

We have already said that the law supposes a man to mean what he says in writing or print. Should the question arise as to the proper interpretation of his words, the courts usually interpret them as the person receiving his letter or circular understood them, provided they are understood in accordance with established and known commercial usage. In the case of the supposed letter, which we have used by way of illustration, Messrs. Smith & Robinson could not be expected to understand from Messrs. Brown & Jones' letter, that their offer was made conditional upon its immediate acceptance. On the other hand, they would know, from their experience of commercial usage, that a failure on their part to reply within reasonable time—longer or shorter, according to the peculiar circumstances of the case, the state of the market, &c.—would be understood by Messrs. Brown & Jones as a refusal of their offer. What a reasonable time would be in such a case, the courts would have to decide upon the evidence.

In this connection we would again call attention to the difference between a specific offer to sell, whether written or printed, addressed to an individual or firm, and a price list sent out for the information of the trade. This difference was either overlooked or ignored in the case of Hall vs. Hall, Kimbark & Co. We do not believe that an order based upon the quotations of a price list, constitutes a legal contract in any case, until the order is accepted. A hardware merchant may publish a price list and send a copy to every buyer in the United States, without, in our judgment, placing himself under any obligations to fill orders received; any more than a man who states that his price for a certain house is \$10,000, and who advertises it for sale at that price, is bound to sell it for \$10,000 to whoever may first tender him that sum. If, however, the owner of the house says, in writing or print, to an intending buyer, "I will sell you my house for \$10,000," or words to the same effect, he must sell it for that, if the intending buyer accepts his offer and makes him a legal tender of \$10,000. We base our judgment partly upon common law as defined in previous decisions, and partly upon the broader and more established ground of established and known commercial usage in the United States.

Some Interesting Immigration Statistics.

The report of the Bureau of Statistics for the month of December and the twelve months ended therewith, contains a number of valuable tables relating to immigration, from which we have gleaned some facts which we think will interest our readers. The total numbers arrived during the year was 422,545, of which 256,400 were males and 49,649 skilled in some trade or occupation which they had come here to follow. Of the total reported Great Britain sent us 159,355, and Germany 133,141. These are the principal sources from which our accessions of population are derived. Taking the British total by counties, we find that Ireland still leads, sending us 75,848, though England is not far behind with 69,000, and Scotland makes a very good showing with 13,008. Wales sends us only 868, which is probably due to the fact that the Welsh miners and iron worker have done so well at home this year in the matter of wages that they have but little present temptation to emigrate. It is a fact worth noticing, however, that of the total of British immigrants 2442 were skilled in some trade or profession, while of those from Germany 2859 were skilled in trades or professions. These totals do not include those professing what are classified as miscellaneous occupations, of whom there come 159,729 from all countries, but only those skilled in some specific profession or industry for which special training is needed. These skilled artisans are the most valuable of the annual additions to our population.

After Germany, the largest annual migration from any one country comes from British America, the number accredited to Canada and the several provinces being 29,596. With this fact before us, we fail to see much encouragement for the efforts now making to induce immigration to Canada, for the temptation to cross the line into the United States is so strong that Canada has lately retained but few immigrants who were worth retaining, while the able-bodied and enterprising have found a more congenial atmosphere and larger opportunities on our side of the St. Lawrence. From Norway and Sweden we received 29,458; from France, 10,813; from Denmark, 5095; from the Netherlands, 4640; from Switzerland, 3223; from Russia, 3490; from Poland, 2863; and from the Azores, 1397. The threatened deluge of Mongolian "cheap labor" dwindles down to 18,154 Chinese and 25 Japanese, which makes a pretty large aggregate, but falls so far short of the promised millions that our workingmen need not be much troubled about it. We have frequently expressed, and still hold, the opinion that the competition of Mongolian cheap labor with the more costly labor of this and other countries, will come at some time in the form of a vast export of cheap commodities from China and Japan. We see no reason why foreign enterprise and skill should not go to China and organize a vast industrial system there, and we have no doubt that, before many years, China and Japan will lead the world in the manufacture of cheap commodities for export.

In looking over the table of occupations, we find material for a very much longer article than we have time to write or space to print, but a few figures will be of interest. The number of iron workers reported is 908, as follows:

Iron dressers.....	5
"founders.....	21
"manufacturers.....	23
"molders.....	723
"puddlers.....	55
"turners.....	13
"workers.....	494

The number of miners is set down at 6290, which is a very important addition to our supply of this class of labor. Among workers of iron, not included above, we find the following: blacksmiths, 1582; boiler makers, 110; cutters, 82; engine builders, 51; file makers, 90; gunsmiths, 43; machinists, 334; nail makers, 9; steel makers, 4; tool makers and grinders 25; saw maker, 1, and safe maker, 1. Nearly all departments of metal working are represented, in some instances very fully; for example, we find 473 tinkers and tin workers, and 272 plumbers reported. Of those styling themselves simply mechanics, there are 1504, and of laborers, 96,607. These immigration tables are not usually considered very cheerful reading, but they will amply repay careful and intelligent examination, and will be found to afford much information. One may gain from them a better idea than can otherwise be obtained, of the heterogeneous and seemingly antagonistic elements entering into, and becoming a part of, what we call American society.

New Publications.

HAND BOOK OF THE LOCOMOTIVE. Including Construction, Running and Management of Locomotive Engines and Boilers. Illustrated. Stephen Rorer, Engineer. Claxton, Remsen & Haffelfinger, Phila.

Since the time when Colburn & Norris published their hand books for locomotive engineers and engine men, there has been no small book for ready reference published. The large works of Clark, Colburn and Weissenborn have been the standard works for reference, and all who were interested in the locomotive engine went to these standards. Those who, from want of means to purchase such expensive works, or who were by circumstances prevented from access to them, were compelled to refer to scattered data in Haswell, Molesworth, Trautwine and Rankine. In this volume the author has attempted to give such facts, figures and rules as are most frequently needed by the locomotive engineer, engine man and fireman, and to make a ready reference book for those engaged on or about locomotives. In addition, much other practical information is given. After taking up the theory of the locomotive, duties of engineers, and the locomotive as an engine, a section is devoted to the subject of water, in which the prominent points are well brought out. Another section on air takes up the points with which the locomotive engineer must be made familiar. Heat, combustion and steam are well and simply treated, and useful and necessary tables are given in connection with these subjects. In taking up the subject of engine building, the author's practical knowledge is well brought out, and a great deal of new and valuable information and many rules are given. The tables of the proportions of engines by the best makers are especially valuable, and are, we think, entirely new, nothing of the kind having been published in this country since the time of Colburn's first hand book. Following this part of the work comes a general discussion of the theory of the locomotive, considered in various ways, and also rules for the adjustment of the valve gear. The remainder of the book contains many tables and much miscellaneous matter, both useful and interesting. We note especially, a few pages devoted to mechanical forces, definitions, etc., and a glossary or vocabulary of terms as applied to the different parts of a locomotive. The first of these, though sometimes faulty in language, gives practical men in a condensed form the definitions of the principal words used in modern works on mechanics. The latter is good, and has long been needed—scarcely anything of the kind which has been published being applicable to American practice. The work will supply a want which has been long felt, and will doubtless have a ready sale. We hope that the author will, in subsequent editions, take opportunity to correct verbal inaccuracies which detract somewhat from certain parts of the work. On the whole, the work is satisfactory and valuable.

Scientific and Technical Notes.

From a long communication, read before the Society of Civil Engineers, of Paris, on the subject of

PUDDLING BY MACHINERY.

we condense the following: It appears that when the rotative furnace of Mr. Menelaus and the furnace of Mr. Danks began to attract attention on the Continent, MM. Petin and Gaudet sent two of their engineers, M. J. Petin and M. Pernot, to study the machines and process in England. M. Petin, in his report, dwells on the difficulties caused by the size of the blooms produced, and the great expense of transforming a puddling establishment, and then proceeds to detail the means adopted by M. Pernot to find another solution of the problem, which should allow of the use of the old material, and preserve the practice of making the iron into rough bars, as in an establishment like that of MM. Petin and Gaudet, employing almost exclusively fine iron, the choice and classification of the iron are indispensable conditions. M. Pernot took the common circular puddling ladle, and caused it to turn round the inclined axle in such a manner that half the bowl emerged from the molten iron in the furnace. The portion of the bowl above the metal came in contact with the flame, became oxidized, and passing round amid the iron produced the action of refining, while the rotation, either by attraction or centrifugal force, caused the iron to mount upon this inclined plane in thin layers, and thus developed enormously the surface exposed to oxidation. These effects combined produced far more perfect puddling than could

be obtained by hand labor, and, especially, more regular. On this principle a furnace has been set to work by MM. Petin and Gaudet. The bowl is mounted on a small cast iron carriage, which rotates with it, and which enables it to be drawn out of the furnace when repairs are required. The movement is given by means of a toothed wheel and pinion, and a small horse is at present employed for the purpose, but a motor is now being planned which will have a cylinder 0.150 metres in diameter, with 0.250 stroke, and a speed of 100 to 150 revolutions per minute, and puddler to revolve at the rate of five or six turns. The head and door of the furnace remain the same, so that at the end of the operation the bloom can be divided as in the old furnaces. Consequently, the same hammers and all the accessories remain unchanged. The experimental furnace was only capable of holding 300 kilogrammes, but it was soon found that the work was much more completely done when the bowl was larger and the charge increased to 500 kilos, or half a ton. M. Pernot recommends that the furnaces should be made to contain 800 to 1000 kilos., and believes that the operation would be quite as complete with the same fire space, for the heat would be augmented by the rapidity of the combustion of the carbon and silicon, phenomenon analogous to that which occurs in the Bessemer converter. By this method it will be seen that the bloom may be divided as much as desired, instead of being limited to one of great size. The iron produced by the Pernot method is declared to be superior to that made in an ordinary puddling furnace. Axes made with the iron produced have given excellent results, supporting trials which common puddled iron could not bear. The economy also is important, the hands required are the same, while the production has, in some instances, been more than doubled; the consumption of coal in treating gray pig is but twelve hectolitres, while it was sixteen to seventeen in the old furnaces; the bowl wears but little and is easily repaired, and a current of water is about to be introduced which will still further reduce the wear; lastly, the loss is very small, not more than 4 per cent., while it was about 10 in the old furnaces, a charge of 500 kilogrammes always yielding 480 to 490 kilogrammes of iron. The furnace being new, the bowl made of plate iron riveted, is garnished with oxide of iron in pieces of various size taken from an ordinary puddling furnace; this first layer should be from 5 to 6 centimetres, or 2 inches thick. The bowl is then replaced and the upper edge is brought as nearly as possible to the cast iron plates supporting the brick work; it is not, however, indispensable that the joint should be perfect, for it has been found in practice that, in a furnace with a blast, the heating and working are not deranged by a space of three or four centimetres. The furnace once dry and heated to whiteness, the interstices between the oxide of iron are filled up in the ordinary way, so as to get as smooth a surface as possible. When all is prepared, which takes about an hour, the puddler is set in motion at the rate of three or four revolutions per minute, the oxide of iron spreads over the whole surface of the bowl, and the attendant, with a hand instrument, covers the edges with the same. The movement of the bowls greatly facilitates this operation, and a fixed jet of water thrown upon the exterior surface prevents its once heating. This jet aids greatly in the working of the furnace; the bowl, in turning, presents successively all parts of its surface to the water, and by this means becomes cool and hardened, while the fire bars are being cleared out and the furnace is ready to be re-charged immediately. When the operation is terminated, the puddler divides the charge into as many bars as he pleases, and this is facilitated by his working always before the door of the furnace, and not having to seek the iron here and there. A charge of half a ton is divided into seven or eight, and this operation, and the carrying of the blooms to the hammer, occupies about half an hour. Each complete operation, including the hammering, takes one hour and fifty-five minutes, and the clearing the bars and re-heating the furnace half an hour. The following are given as the result of the working of the Pernot furnace at Saint Chamond: The production of the week, of eleven workings of twelve hours each, is regularly 25 tons of fine iron, while with the same pigs, that is to say, gray charcoal iron, a common puddling furnace only yields 12 tons; the charge for pig iron is only 1030 kilogrammes instead of 1300, as in the old furnace. The hand labor and minor expenses are diminished, and the consumption of coal reduced from 1500 to 1200 kilogrammes. It was stated in the discussion that Mr. Maudslay tried some years since to arrange a similar furnace to that of M. Pernot, but found an insurmountable difficulty with the joint between the turning bowl and the sides of the furnace, which does not, as already stated, interfere with M. Pernot's blast furnace.

Mr. J. Fattrell, of Dublin, has secured a patent for an

IMPROVEMENT IN THE MANUFACTURE OF PIPES, for the conveyance of water at high pressure, gas, and saline solutions. The improvement consists mainly in the fusion of certain ingredients, to form a homogeneous composition of the nature of a concrete or artificial stone, forming a hard and durable material, the density of which may be enhanced by the employment of pressure in the process of casting. The ingredients and proportions assigned are: Thirteen cwt. of finely pulverized stone, two cwt. of Trinidad bitumen, two cwt. of bituminous rock, with four gallons of shale oil, or its equivalent, for the purpose of effecting a more intimate union and interpenetration of the bituminous rock and the natural bitumen. Pipes manufactured in this manner are said to be very durable and superior to those made by the ordinary process.

THE GREAT WOOLWICH STEAM HAMMER, described in *The Iron Age* of April 17th, 1873, has been set to work. It is a 30 ton hammer, but the weight of the falling portion is nearly 40 tons, and its force is accelerated many times by the use of steam to drive it down from the top. It is estimated that the use of the "top steam" is equal to allowing the hammer to fall of its own weight from a height of 80 feet. It has been allowed a striking fall of 15 ft. 3 in., and it has not yet been determined what is the actual force of the blow it will strike. The hammer is 45 feet in height, and covers with its supports a base of about 120 feet square. Above the ground it weighs 500 tons, and the iron used in the foundation below weighs 665 tons. It has cost altogether about £50,000, the greater part of which has been paid to Messrs. Nasmyth, Wilson & Co., the patentees and manufacturers. One of the furnaces from which the hammer is to be fed was also set to work on the same day. It is large enough to make a comfortable dwelling house, and an omnibus might be driven in at the doorway. The door of this furnace weighs seven tons, and is, as usual, an iron frame filled in with fire bricks, of which it required 1500. The construction of this furnace has absorbed altogether no fewer than 15,000 bricks, without including the chimney. The Emperor of Russia, will, it is expected, visit the Royal Arsenal about the third week in May, when the heaviest portion of an 80 ton gun will be welded by this hammer in his presence.

THE IRON WORK OF THE ST. LOUIS BRIDGE has been completed by the Keystone Bridge Company. The bridge proper consists of three arches each, over 500 feet in length. Platforms could not be built from which to construct the arches on account of the rapid river current, and of their interference, if erected, with the business interests of St. Louis. These difficulties were met, however, by the engineering skill of the contractors. From each of the two river piers arches were sprung which balanced each other as they were being built, and from which the workmen's platforms were suspended. The arcs to meet these were balanced from the shore piers by counterpoise weights, so arranged as to automatically support the arc in its proper position, notwithstanding the contraction and expansion always going on in the metal supporting rods. Link by link the spans were built out from six different points, until the three arches met over the river and were firmly banded together. The bridge is a wonderful specimen of skill in construction, and this, no less than its great size and cost, will make it attractive to tourists. Its cost, including tunnel and approaches, will not be less than \$10,000,000. The bridge is sixty feet above high water, but complaints have been made that it is not high enough to allow the passage of the great Mississippi steamboats under its spans. The immense smoke stacks on these boats, however, can probably be cut off to suit the bridge, and if not they can be so constructed as to be "telescoped" one section within another while they are passing under it.

Mr. Edward H. Bonsall, first treasurer and second president of the Germantown Railroad Company, has read a paper on

EARLY RAILROADING IN PHILADELPHIA.

before the Pennsylvania Historical Society, giving a detailed account of the building of the Germantown Railroad. The road was projected by Mr. Bonsall and the late John Schertz, in 1827-28. In 1830, Mr. John Edgar Thomson, now president of the Pennsylvania Railroad Company, was employed to make an experimental exploration, and in 1830-31, application was made to the State Legislature for a charter modeled after that of the Baltimore and Ohio Railroad Company. The subscriptions to the stock far exceeded the whole amount to be issued, and in May, 1831, the company was organized by the election of the late Col. John G. Walmough president, and Edward H. Bonsall, treasurer. In June, 1832, the road, five miles in length, was opened with great ceremony, the members of Councils of New York and of Philadelphia being invited to attend. The cars were procured from Baltimore and were drawn by horses. On November 23d, 1833, the first locomotive built in the United States was placed on the road. It was constructed by the late Matthias W. Baldwin. For weeks it was a great curiosity. Mr. Bonsall states that "the president, feeling anxiety lest somebody should be run over and killed, generally passed up and down with the train, and on approaching the city and looking forward, especially on holidays, Ninth street, from Poplar to Green street, appeared to be black from side to side with a dense mass of people collected to witness the action of this novel motive power." The influence of the railroad on the old borough of Germantown is shown by the growth of that place. The Germantown of 1832 had not within its limits ten houses of less than thirty years old, and the surrounding country, within a circle of six miles circumference, not embracing five houses of a grade above ordinary farm houses. The Germantown of to-day contains, on or near the main street, more than one hundred recently built and tasteful homes, and the country for miles around is studded with handsome villas. The public conveyances in 1832 did not carry more than fifty passengers a day between Philadelphia, Germantown and Chesnut Hill. The steam road carried last year 2,212,390 passengers, being a daily average of 6080.

In a recent number of *Dingler's Journal*, C. Mehu publishes a paper on

THE ALLOYS OF BISMUTH WITH POTASSIUM AND SODIUM.

The experimenter placed 200 grams of pulverized commercial bismuth along with 100 grams of dry tartrate of soda and potash (Rochelle salts) in an earthen crucible, closed it and heated for an hour to a red, and even a white, heat, then allowed it to cool. The regulus found in the bottom of the crucible weighed

198 grams, and some globules of metal were found in the slag. The operation was repeated, substituting in one case tartrate of potash, and in another tartrate of soda, and every time 198 grams of metal were obtained. At a red heat the tartrates of the alkalies are converted into carbon and carbonates, then into caustic alkalies, and finally into the metallic state, when they unite with the bismuth. The mixture of the carbonates of potash and soda from the double tartrate of potash and soda, fuses easier than either of the carbonates themselves. The alloy of bismuth with an alkali metal looks brighter and redder than pure bismuth. The iridescence of bismuth is not only pleasing to look at, but is also an indication of the good quality of the metal, and is due to the beginning of oxidation. The alloy decomposes water, liberating hydrogen; in boiling water the action is violent. In order to remove the alkaline metals it is only necessary to fuse the alloy in a porcelain dish or iron vessel with a broad surface, when the alkali metals oxidize and cover the fused bismuth with a volatile coating of caustic alkali. After all the alkali is oxidized the bismuth becomes coated with a film of yellowish-brown oxide. At this instant the metal must be poured out. To remove the last trace of alkali it is fused with saltpeter. The same author recommends the following method of

PURIFYING BISMUTH.

The metal is fused in a broad, shallow vessel at a temperature considerably above its melting point, whereby about one-fourth of the bismuth is oxidized, and both arsenic and sulphur are driven off as acids. When cold the residue is pulverized, mixed with carbonate of potash, one-fourth the weight of the metal being taken, and also with carbon and dried soap. A crucible is filled to one-eighth its volume with this mixture, and pulverized charcoal added until the crucible is full. It is then covered and heated for an hour to a red heat. The metal may then be poured out, or it is better to let the crucible cool, when a regulus of bismuth and potassium will be found at the bottom. The potassium may now be removed as above described.

THE LAUNCH OF THE CITY OF TOKIO.

Description of the New Vessel.

CHESTER, Pa., May 13.—The town was thronged with strangers to-day to witness the launch of the Pacific Mail Steamship Company's new steamship, *The City of Tokio*. All the regular trains were crowded with passengers, and the river in front of Mr. John Roach's iron shipbuilding yard was covered with steamboats and tugs from Philadelphia, loaded with people. Every point of observation along the river was thronged.

At 10:15 o'clock, a. m., the vessel glided gracefully along the ways amid the cheers of the spectators. As the hull touched the water the event was hailed with a salute from a battery on the wharf and music from bands on the excursion boats.

The *City of Tokio* is to be fitted out here entire, unlike the *City of Peking*, which was towed to New York to receive her boilers and machinery. The *City of Tokio* is of 5500 tons burthen. Her extreme length is 423 feet by 48 feet breadth of beam, and she is 38 feet 6 inches deep between the top of the keel and the spar deck. She has four decks and six water-tight compartments. She will accommodate 150 cabin passengers and 1800 steerage passengers, and her coal bunkers will carry 1500 tons. In all other respects she is a similar vessel to the *City of Peking*, and is built of material of the same quality used in the construction of that vessel. She will be furnished with all the latest improvements in steam navigation, and her accommodations for passengers will be unsurpassed.

The christening of the "*City of Tokio*" was probably the most elaborate and graceful ceremony of the kind ever witnessed. The christening party was composed of Commander Jefferson Maury, of the Pacific Mail Steamship Company, and Mrs. Maury, and Miss Lulu Wickham, of New York City, and Miss Louise Sheppard, of California. Commander Maury's idea was to have New York and San Francisco and the Atlantic and Pacific Oceans represented at the christening, and Miss Sheppard made the trip from California expressly to represent the ocean on which the new steamship is destined to run. New York being the vessel's port of registry, the bottle was broken and the name pronounced by Miss Wickham.

Lehigh Valley Notes.

The Allentown, Pa., *Chronicle* publishes the following:

The following list of blast furnaces in operation and idle at present, in the Lehigh Valley, was prepared for and will be presented to the Ways and Means Committee of Congress, and exhibits the present state of pig iron manufacture in this vicinity:

Carbon, Parryville, three stacks, 3 in blast and 1 idle.
Lehigh Valley, Coplay, three stacks, 2 in blast and 1 out.
Thomas, Hokendauqua, including Lock Ridge, eight stacks, 4 in blast and 4 idle.
Crane, Catasauqua, 6 stacks, all idle.
Allentown, Allentown, 5 stacks, 4 in blast and 1 out.
Roberts, Allentown, two stacks, 1 in blast and 1 idle.
Lehigh, Aineyville, near Allentown, two stacks, both in blast.
Bethlehem, Bethlehem, three stacks, 2 in blast and 1 idle.
Saucon, Hellertown, two stacks, 1 in blast and 1 out.
North Penn., Bingen, one stack, which is in blast.

Northampton, Freetmansburg, one stack, which is in blast.

Coleraine, Reddington, two stacks, 1 in blast and 1 idle.

Usher's Furnace, above Glendon, one stack, which is in blast.

Glendon, Glendon, five stacks, 4 in blast and 1 idle.

Andover, Phillipsburg, N. J., three stacks, 2 in blast and 1 out.

Keystone, Chain Dam, one stack, unfinished.

The above shows a total of forty-eight stacks, twenty of which are idle. They represent a capacity to produce from 450,000 to 500,000 tons of pig iron annually.

The same journal gives the following interesting particulars respecting the Crane Furnace at Catasauqua:

The company are taking advantage of the present interval of idleness to remodel, repaint, repair, and generally to fix up things about the furnaces, for which previous to the present time they never could get a sufficient opportunity. New walls are being laid about the extensive premises where they are required, and new and improved hoisting apparatus is being brought into readiness for use whenever the iron market stiffens up to a condition that will warrant the blowing in of their furnaces, six in number, all of which are at present idle. The large and carefully built stand pipe, necessary for the ample supply of water to the works, is rapidly approaching completion, and will soon be ready to demonstrate the advantages of the stand pipe system over the reservoir, for the distribution of water where the source of supply is generous and inexhaustible. The cinder engines, which draw the cinder cars to the banks where that waste is deposited, are undergoing a considerable contraction as to their outside appurtenances, in order that they may pass without obstruction under the low places that occur on their route; their smoke stacks, domes and whistles are being shortened, and the alterations to the "Comet" are nearly made. What are known as fifty-pound rails are being laid in a track, upon which the cinder cars will run to transport the cinder below Biery's Bridge, between the present immense cinder heaps and the L. & S. R. R. A well constructed and large crane has been made portable, to run between the track of the cinder cars, and will be used in hoisting the sides of the cinder cars when dumping the cinder. The company are also building their fifth engine, which will be a handsome locomotive with six wheels, and provided with the improvement of a steel fire box. This engine will take the place of the oldest engine about the works, which latterly has not been used much. The company's machine shops are run by water, where power is required, and a room connected with the shops contains the pump that supplies the Borough of Catasauqua with water—and also the company's pump—which is forced into a stand-pipe and thence distributed. These pumps are such perfect working pieces of mechanism, that we are told they require very little attention, the use of Dreifloos' patent self-feeding oil cups proving a most valuable labor-saving appliance. These oil cups were filled in January last, and up to the present date one-third of the oil contained in them has not been consumed.

No. 6 stack, of the blast furnaces, which has been connected with the works since 1868, is claimed to be the champion stack in the valley. When it was a 16½ feet stack it turned out 23½ tons of all one X iron in a week. It is now 60 feet in height and 18 feet in diameter. This stack has been pretty well burned out and will be relined.

No. 3 stack, which had just been blown in before the strike occasioned a total suspension of operations, is now in readiness to be blown in again at 48 hours' notice, whenever the price of iron is at a paying demand. In fact, five of the stacks can be blown in at three days' notice.

No. 1 stack is the parent of all the furnaces in the Lehigh Valley, having been built by David Thomas, Esq., thirty-four years ago. From its success sprang all the large manufacture of iron with anthracite in this country. It is 45 feet high and 11 feet in diameter, being the smallest stack of the six, in dimensions, but it has made 142 tons of one X Bessemer iron in a week.

Stack No. 4 is 55 feet high and 17½ feet in diameter.

Baron Schwarz-Senborn on the Centennial.—Baron Schwarz-Senborn, Director General of the Vienna Exposition, recently appointed Austrian Minister to the United States, has written the following letter, just received in Philadelphia:

VIENNA, March 30, 1874.—Sir: I acknowledge the receipt of your letter of January 6, as well as of the copy of the report on the Vienna Universal Exposition, made by the Commission for the city of Philadelphia, whereof you are the worthy president, to the authorities of that city, which I have perused with much pleasure, and beg to tender you my thanks for your attention. Being, by the pleasure of my sovereign, the Emperor, appointed Minister Plenipotentiary to the United States, to represent the government of Austria-Hungary, I hope to have soon the opportunity to get acquainted with your renowned city, the cradle of your national existence, and with the products of American genius, which will be set forth at the intended Centennial Exposition.

Please, sir, accept my apology for not having answered your letter before this, being prevented by the great pressure of official business connected with the liquidation of the late Universal Exposition.

I remain, sir, your obedient servant,
SCHWARZ-SENBORN.

To E. Mitchell Esq., president of the Commission to Vienna Exposition, Philadelphia.

A Mass in Forging.—The *Paterson Press*, says: We noticed at the Erie Station this morning, billed to the Narragansett Steamship Co., an exceedingly large shaft, forged and finished by our Paterson Iron Company and intended for the Steamer "Plymouth Rock." Its weight was 27,616 lbs., its length 32 ft. 3 in., and its average diameter 18½ in., being in some places over 30 inches.

Trade Report.

Office of THE IRON AGE.
WEDNESDAY EVENING, May 13, 1874.

The past week has brought but little improvement in the condition of our financial markets, which remain dull and feverish. Congress has not only made no progress in financial legislation, but it has manifested no disposition to do anything, and the probabilities now are that nothing will be done during the present session. Money has been very abundant, for the reason that no one has had any use for it, and call loans have been easily obtained at 3 @ 4 per cent. Commercial paper is fairly quotable at 5 @ 7 per cent. for double endorsement. The following is a comparison of the bank averages for the past two weeks:

	May 2.	May 9.	Differences.
Loans.....	\$266,574,300	\$266,503,600	Dec. \$70,700
Specie.....	24,639,600	27,905,500	Inc. 3,265,900
Legal Tm.....	25,835,000	25,798,600	Dec. 36,400
Deposits.....	234,401,500	236,236,700	Inc. 1,835,200
Circulation.....	26,889,600	26,922,300	Inc. 32,600

The gold market has been without feature, and the premium has fluctuated within very narrow limits, as appears from the following comparison of highest and lowest daily quotations:

	Highest.	Lowest.
Thursday.....	112 1/2	112 1/2
Friday.....	112 1/2	112 1/2
Saturday.....	112 1/2	112 1/2
Sunday.....	112 1/2	112 1/2
Tuesday.....	112 1/2	112 1/2
Wednesday.....	112 1/2	112 1/2

The stock market has been weak and unsettled, and speculative shares have offered but little temptation to operators. The principal dealings have been in Western Union, Lake Shore, Union Pacific, St. Paul, Pacific Mail, and Southwestern.

Government bonds have been without feature, fluctuating with gold.

The following shows the foreign trade movements for the week:

	1872.	1873.	1874.
Total for week.....	\$7,425,996	\$6,387,442	\$6,515,037
Prev. reported.....	156,892,805	156,897,735	144,711,176

Since Jan. 1.....\$163,318,821 \$163,325,177 \$151,326,213

Included in the imports of general merchandise for the week are:

	Quant.	Value.
Brass goods.....	14	\$1,862
Bronzes.....	14	1,309
Chains and anchors.....	27	1,630
Copper.....	4	4,116
Cutlery.....	73	10,010
Gun.....	3	3,168
Gun barrel moulds.....	85	7,998
Hardware.....	1,790	45,913
Iron pig, tons.....	149	20,757
Iron sheet, tons.....	2,494	30,773
R. & R. bars.....	3,301	63,219
Iron cotton ties.....	100	387
Iron, other, tons.....	73	6,479
Lead, pigs.....	2,494	30,773
Metal goods.....	149	20,757
Nails.....	9	106
Needles.....	8	3,789
Old metal.....	1	1,478
Platinum.....	2	3,996
Per caps.....	1	1,309
Saddlery.....	7	1,520
Steel.....	3,283	70,731
Silverware.....	2	109
Tin, boxes.....	13	477
Tin, bble.....	15	1,022
Tin, 3,438 slabs.....	407,778	106,664
Wire.....	37	2,932
Zinc.....	66,808	1,745

Total for the week.....	\$3,524,063
Previously reported.....	10,812,284
Total since January 1, 1874.....	\$13,340,345

Government bonds closed as follows:

	Bid.	Asked.
U. S. Currency 6s.....	116 1/2	116 3/4
U. S. 6s 1861, reg.....	119 1/2	119 3/4
U. S. 6s 1861, cou.....	121 1/2	121 3/4
U. S. 6s 1862, 5-20 reg.....	115	115 1/2
U. S. 5-20 1863, cou.....	115 1/2	115 3/4
U. S. 5-20 1864, reg.....	116 1/2	116 3/4
U. S. 5-20 1864, cou.....	117	117 1/2
U. S. 5-20 1865, reg.....	116 1/2	116 3/4
U. S. 5-20 1865, cou.....	118	118 1/2
U. S. 5-20 1865, reg. new.....	119 1/2	119 3/4
U. S. 5-20 1865, cou.....	119 1/2	119 3/4
U. S. 5-20 1867, reg.....	119 1/2	119 3/4
U. S. 5-20 1867, cou.....	120 1/2	120 3/4
U. S. 5-20 1868, reg.....	119 1/2	119 3/4
U. S. 5-20 1868, cou.....	120 1/2	120 3/4
U. S. 10-40 reg.....	114 1/2	114 3/4
U. S. 10-40 cou.....	114 1/2	114 3/4
U. S. 5s 1861 reg.....	115 1/2	115 3/4
U. S. 5s 1861 cou.....	115 1/2	115 3/4

The following were the highest and lowest prices of stocks to-day:

	Highest.	Lowest.
N. Y. Cen. & Hudson Consolidated.....	91 1/2	91 1/2
Lake Shore.....	76 1/2	76 1/2
Rock Island.....	97 1/2	97 1/2
Del. Lack. and Western.....	107 1/2	107 1/2
Wabash.....	39	37 1/2
Canton Land Co.....	64	56
Western Union Telegraph.....	71 1/2	70 1/2
Northwestern.....	42 1/2	42 1/2
Milwaukee & St. Paul.....	53 1/2	53 1/2
do. do. Preferred.....	53	52 1/2
Pacific Mail.....	44 1/2	43 1/2
Eric.....	35 1/2	35 1/2
Ohio & Mississippi.....	23 1/2	23 1/2
Union Pacific.....	19 1/2	19 1/2
C. & Ind. Central.....	19 1/2	19 1/2
Hannibal and St. Joseph.....	27 1/2	27 1/2

Westward Freights by Rail.

The following are the rates charged on Westward freights from New York to some of the principal Western trade centers per 100 lbs.:

NEW YORK TO	All Rail.				Special.
	1st.	2d.	3d.	4th.	
Cleveland.....	65	50	40	30	
Sandusky.....	72	55	44	32	
Columbus.....	80	63	50	36	
Cincinnati.....	92	73	58	41	
Louisville.....	113	92	71	50	
St. Louis.....	128	105	82	57	
Calo.....	77	60	46	33	
Toledo.....	100	80	60	45	
Chicago.....	100	80	60	45	
Milwaukee.....	100	80	60	45	
Detroit.....	70	55	42	32	

The following are the new classifications of metals and standard metal goods:

First Class.—Bath Tubs, Guns, Rifles and other Firearms; Iron Castings, loose, under 100 lbs., owner's risk; Lead, bar or sheet; Lead Pipe, in reels or rolls; Machinery, unboxed, owner's risk; Refrigerators, Scales and Scale Beams, not boxed; Scythes, in bales; Scythe Snaths; Shot, in bags; Stoves, owner's risk; Stove Plates, owner's risk; Stove Pipe; Tin Ware, boxed; Tools, Mechanics.

Second Class.—Antimony, crude; Bells; Block Tin Pipe, in casks; Brass and Pewter Faucets; Carriage Springs, boxes and axles; Chains, loose; Copper, in boxes or casks; Copper and Brass vessels; Copper in plates; Sheets, bolts, ingots, wire, nails and rods; Cutlery; Emery; Forks, hay and manure; Gas Fixtures, boxed; Hardware, Hinges, Hoops, Hollow Ware; Iron Castings, in boxes or casks; Iron, hoop and sheet, owner's risk; Iron Railing; Machinery, boxed; Nails, in bags; Plumber's Materials, in boxes or casks; Sand Paper; Scales and Scale Beams, boxed; Scythes, in boxes; Shovels and Spades; Timers' Trimmings; Wire; Zinc, in rolls or sheets.

Third Class.—Anvils; Axes; Chains, in casks; Horse Nails, in boxes and bags; Iron Nuts, Bolts, Washers and Rivets, in boxes or casks; Junk; Lightning Rods; Nails, in boxes; Picks, in casks; Plumbago; Roofing Iron; Scythe Stones; Stove Polish.

Fourth Class.—Agricultural Implements; Antimony, metal; Anchors; Bath Brick; Chain Cable, loose; Fire Brick; Gas Pipe; Grindstones; Horse Shoes, in packages; Iron Castings, plain, not machinery, over 100 lbs. each piece, owner's risk; Iron, scrap, loose; Iron, pig, bar, band and boiler; Lead, in casks; Lead, bar or sheet, boxed; Lead Pipe, in casks; Nails, in kegs; Nail Rods; Railroad Chairs and Spikes; Railroad Iron; Roofing, in boxes or rolls; Shot, in kegs; Shot, in 100 lbs. double sacks; Spelter, in slabs or casks; Spikes, in kegs; Steel, in boxes or bundles; Stoves and Stove Plates, in car load lots, released, estimated weight 20,000 lbs.; Tubing, wrought and cast iron; Water Pipe, wrought and cast iron, owner's risk; Water Pipes, cast iron; Zinc (sheet), in casks or cases; Zinc Paints.

Special.—Fence Wire, in bundles; Lead, pig; Tin, plate, pig or bar.

GENERAL HARDWARE.

Trade seems to be falling off, and complaints of dullness are becoming general, though some houses report a fair business.

In our issue of the 16th ult. we erroneously printed the price of Frost, Derby & Co.'s No. 2 Ring Scythe Snath, \$9.25. It should have been \$9.50.

Russell & Erwin Mfg. Co. have added to their variety of Knobs a line which they call Nickel and Gold. The raised surfaces are polished and nickel plated, while the other parts are gilt. The effect is very fine, as the gold shows off the nickel plated parts in a way that is surprising, making a very fine effect. These goods will be sold at low prices, and in our opinion must become very popular. This house have a stock of Rogers' Self-Sharpening Hoe, in which the blade is made of a sheet of iron welded to a sheet of steel, and as the iron will wear more rapidly than the steel, the edge is always kept sharp by use. The price is \$6 per dozen, net, for 7 and 7 1/2 inch.

Charles Parker, Meriden, Conn., and 83 and 85 Duane street, New York, has issued a handsome illustrated price list under date of 15th ultimo. Among the new goods added we notice Parker's Patent Gate Hinge No. 10, which is self-shutting and swings both ways. Price, \$9.50 per dozen sets, less discount 10 per cent. The following discount sheet has been issued, and applies to the new catalogue:

CHAS. PARKER'S DISCOUNT SHEET, FOR CATALOGUE, EDITION APRIL 15TH, 1874.

Page.	Dis. per cent.
61, Barn Door Hinges.....	10
61, " Rollers.....	10
70, Bed Keys.....	10
165, Bells, Call.....	10
67, Bench Screws.....	10
154, Blind Butts.....	10
152-153, Blind Fastenings.....	10
149, Blind Hinges.....	10
151, " ".....	10
85, Boot Jacks.....	10
132, Cake Turners.....	10
144, Candlesticks.....	10
63, Chain Pump Fixtures.....	10
11-24, Coffee Mills.....	10
65, Coffee Pot Stands.....	10
71-72, Copying Presses.....	10
160, Cork Screws.....	10
10, Corn Mill.....	10
77, Door Handles.....	10
82, Eye Glasses.....	10
88, Eye Protectors.....	10
95, Eye Glass Cases, Tin.....	10
95, " German Silver.....	10
75, Faucets, Ball's.....	10
135-137, Flesh Forks.....	10
137-138, " Hooks.....	10
157-158, Foot Scrapers.....	10
82, Friction Plate for Machines.....	10
154-156, Gate Hinges.....	10
130, German Silver Spoons.....	10
153, Gimlets, Nail.....	10
150, " Spike.....	10
16, Gimlet Bits.....	10
65-69, Gridirons.....	10
62-64, Grindstone Trimmings.....	10
74, Hammers, Nail.....	10
74, " Shoe.....	10
75, " Carpet.....	10
114, Knives, Solid Steel.....	10
139-142, Ladles, Tinned Iron.....	10
144, Lanterns.....	10
81-82, Latches, Rogins.....	10
81-82, Match Safes, Bronzed Iron.....	10
83-84, " Pocket, Tin.....	10
84, " German Silver.....	10
75, Meat Pounders.....	10
73, Molasses Gates.....	10
76, Mop Sticks.....	10
11-12, Planter's Mills.....	10
136, Preserve Spoons.....	10
11, Quilt Frame Clamps.....	10
111, Re-plated old work, Spoons, etc.....	10
65, Sad Iron Stands.....	10
64, Saw Rods.....	10
161-163, Scales, Ten and Hatch.....	10
157-158, Scrapers, Foot.....	10
160, Screw Driver Bits.....	10
143, Skimmers.....	10
99, Soap Boxes, Tin.....	10
94, " German Silver.....	10
85-87, Spectacles.....	10
95, Spectacle Cases, Tin.....	10
80-90, " German Silver.....	10
121-125, Spoons, Albata Metal.....	10
117-118, " Argentine.....	10
122-123, " Basting.....	10
121-125, " Britannia Metal.....	10
134, " Decarbonized Steel.....	10
134, " Excelsior, Silver Steel.....	10
127-130, " Tinned Iron.....	10
131, " Tin.....	10
78-79, Store Door Handles.....	10
29, Stove Bolts.....	10
29, Stove Bolt, Head, Iron, Flange Pointed.....	10
28, " Brass.....	10
27, " Round Head, Iron.....	10
27, " Flat.....	10
29, " Flat Iron, Machine.....	10
29, " Round.....	10
30, " Silver Capped.....	10
31, " Brass.....	10
30, " Flat.....	10
31, " Brass.....	10
164, Shot Guns, Breech Loading.....	10
100-115, Silver Plated Table Ware.....	10
163, Tin Measures.....	10
96-99, Tobacco Boxes, Tin.....	10
9-94, " German Silver.....	10
32-33, Vises, Parker's Patent.....	10
60, Vises without Parker's Improvements.....	10
69, Waffle Irons.....	10
71, Wagon Jacks.....	10
145, Window Strip Fastener.....	10

The National Association of Wrought Iron Pipe Manufacturers held a meeting in Pittsburgh on Wednesday and Thursday of last

week. The attendance was very large, nearly all of the mills that are in the association being represented.

The following is a list of the firms having representatives at the convention: Morris, Tasker & Co., Philadelphia; National Tube Works, Boston and McKeesport; W. C. Allison & Sons, Philadelphia; Spang, Chalfant & Co., Pittsburgh; Byers, McCollough & Co., Pittsburgh; William Graff & Co., Pittsburgh; Seyforth, McManus & Co., Reading; Albright Brothers & Co., Allentown; Benton Steam and Gas Pipe Works, Brooklyn, New York; Fieldhouse & Dutocher, Chicago; Crane Brothers' Manufacturing Company, Chicago; Camden Tube Works, Camden, N. J.; Washington Pipe Works, Boston; Evans, Fieldhouse & Co., Newport; Taunton Iron Manufacturing Company, Taunton, Mass.; Middletown Tube Works, Middletown, Pa.; Seville & Chase, Cleveland, O.; Albert Smith's Pipe Works, Cohoes, N. Y.; Enoch Lamb's Pipe Works, New York; Isaac J. Griffith & Brothers' Industrial Pipe Works, Philadelphia.

A committee was appointed to prepare a uniform scale of prices, who reported the following revised list, which was unanimously adopted. The convention adjourned to meet at Niagara Falls, August 6th.

The following is the revised list issued under date of 7th inst., and is subject to a discount of 40 per cent. to consumers; to the jobbing trade a concession from this price would be allowed:

MANUFACTURERS' REVISED PRICE LIST, WROUGHT IRON WELDED TUBES, FOR GAS, STEAM AND WATER.

Inside diameter.	Price per foot, plain.	Price per foot, galvanized.
Inches.	\$ c.	\$ c.
1/2	06	09
3/4	07	10
1	07	10
1 1/4	09	13
1 1/2	10	14
1 3/4	11	15
2	12	16
2 1/4	13	17
2 1/2	14	18
2 3/4	15	19
3	16	20
3 1/4	17	21
3 1/2	18	22
3 3/4	19	23
4	20	24
4 1/4	21	25
4 1/2	22	26
4 3/4	23	27
5	24	28
5 1/4	25	29
5 1/2	26	30
5 3/4	27	31
6	28	32

A comparison of this list with the former one issued Feb. 11th, shows an important reduction on all the smaller sizes.

Morris Tasker & Co. have also issued a revised list for their Vulcanized Rubber Coated Tubes, which is given below:

VULCANIZED RUBBER COATED IRON PIPE, FOR GAS AND WATER.

Inside diameter.	Price per foot.
Inches.	\$ c.
1/2	12
3/4	16
1	22
1 1/4	30
1 1/2	35
1 3/4	40
2	50
2 1/4	55
2 1/2	60
2 3/4	65
3	70
3 1/4	75
3 1/2	80
3 3/4	85
4	90

The discount from the above is 35 per cent.

Q. S. Backus, No. 82 Chambers street, has added to his line of Bit Braces two new patterns. No. 9, list \$15, No. 11, list \$16, less discount 40 and 10 per cent. These are well finished goods, Wood Heads, with the Socket for holding Bits, same quality and size as in the higher grades. Although these goods are only a few days on the market, we are informed that they are meeting with a favorable reception by the trade, and several large orders are already in the manufacturer's hands. Orders for a limited amount can be filled promptly.

We invite the attention of the trade to the advertisement on the eighth page of Peter A. Frasse & Co., No. 95 Fulton street. This house was established in 1816 by Henry F. Frasse, father of the senior member of the present firm, on the same ground now occupied by them. They make a specialty of first-class mechanics tools, and are sole agents for Thos. Turner & Co., of Sheffield, England, whose Files and Rasps have attained an enviable reputation for uniform excellence. They have now in stock a full line of Files and Rasps of this make, which they offer to the trade at \$5 to \$6 for Files and \$5.50 to \$6 for Rasps. They also make a specialty of P. S. Stub's Files and Tools, which they quote at \$8 to \$2, all gold. They have just received eight cases of Turner's Files and Rasps, and also by the Cuba three cases of Stub's Files.

Trade in Foreign Hardware is generally reported quiet, and we hear of no changes in quotations.

There is little to report concerning the Nail market; trade continues fair, but prices continue in the depressed condition noticed for several weeks. We quote Nails in small lots at \$4, net. Orders for 50 kegs and upward are easily placed at \$3.90, net, for 10d., while there is little doubt but a large buyer could shade this figure a trifle.

In House Furnishing Goods, Tinners' Trimmings, &c., general stagnation is complained of. Some houses, however, have a fair demand for seasonable specialties, and we have heard of some good orders for Water Coolers and Cream Freezers being placed during the week. We have changed our quotations on Copper Rivets and Burs to discount 25 per cent., as the association discount, viz., 10 per cent., is no longer adhered to, and orders are easily placed at the former figure.

The Nashua Lock Company, J. Clark Wilson & Co., agents, have made the following changes in their list of January 1st, 1874:

No.	Per doz.	No.	Per doz.
160.....	\$16.50	58.....	\$7.50
215.....	25.00	70.....	28.00
255.....	55.00	770.....	12.00
370.....	12.25	509.....	12.00
3065.....	7.00		

<i>Porcelain Shutter Knobs.</i>					
Inch.....	$\frac{3}{4}$, $\frac{1}{2}$	1 1/2	1 1/2	1 1/2	2
Per gross...	\$1 75	5 25	6 75	7 50	9 25
<i>Porcelain Drawer Knobs.</i>					
Inch.....	1 1/2	1 1/2	1 1/2		2
Per gross...	\$1 75	8 50	9 50		10 25
<i>Mineral Shutter Knobs.</i>					
Inch.....	$\frac{3}{4}$, $\frac{1}{2}$	1	1 1/2	1 1/2	2
Per gross...	\$1 75	5 25	5 75	6 25	7 25
<i>Mineral Drawer Knobs.</i>					
Inch.....	1 1/2	1 1/2	1 1/2		2
Per gross...	\$6 50	7 00	7 50		8 25
<i>Eccutechons.</i>					

conclude that it must be many months hence before the iron trade can revive to any appreciable extent, and then rigidly subject to a definite and well defined drop in wages and fuel, which would bring about a fall in the quotations for raw materials and finished iron. The general tendency of public opinion and the index of trading transactions at the present time point in this direction, hence it would appear to be not only excessively inconsistent, but purely speculative, for a contrary opinion to be put forward and advocated with such poor materials as could be gathered together in support of the idea that the *revival of the iron trade may come about much sooner than most people imagine*. And yet I have an idea that such an opinion—speculative and visionary though it may appear—may after all prove the correct one. At any rate, my own information on the subject, gathered from the whole of the iron districts of Great Britain, during the past few days, points to a clear and decided strengthening of the market in all directions—except perhaps in South Wales—manufacturers and merchants having apparently arrived at the conclusion that prices have been forced down to the minimum, a decision which is probably more decided by their knowledge of the fact that Russian and other orders must (in consequence of the clearing of the Baltic) be placed “now or never.” And when we examine into the premises, which apparently warrant the *selera* in so concluding, they evidently have many arguments in their favor, although an impartial observer may not inaptly believe that prices must fall yet lower before any material spread of activity takes place. In the first place stocks in Scotland are low, and many brands, such as Gartsherrie (hitherto used very generally in English foundries), cannot be had, but, on the other hand, Cleveland is overstocked with common pig iron, hence we find that for some months past, owing to the difference in prices, heavy quantities of Cleveland iron have been exported into Scotland. Thus these two opposing matters operate to no particular purpose, the one in fact nullifying the probable influence of the other. But then as Scotch pig iron and Cleveland pig are very different things, when it comes to a question of quality and capability of being worked up for specific purposes, it follows that unless Scotch iron be produced in greater quantity (by the relighting of the many blast furnaces now out) prices *there* must rise notwithstanding the fact that the demand is in excess of the demand. What then one asks, must become of the Middlesbrough pig iron? a query somewhat difficult to dispose of. Ordinarily Germany, Holland, Belgium and France take large shipments of this pig iron, the balance of the production being consumed in the immediate vicinity and in Sheffield, West and South Yorkshire for mixing purposes. Now, however, the foreign trade is bad, and consignments are lighter than they are as rule after the breaking of the *ice*. Hence we find that the production of pig iron was hardly ever known to be so small, yet, limited as it is, it is in excess of the demand. This, however, is not wholly owing to the mutual relations between the producers and consumers in the district, seeing that another producer—the Belgian—has made his appearance, and is carrying off many good incidents—orders which would, were he unable to compete as to prices, afford work for local mills and forges. Thus, to prove that there is a certain demand, although Middlesbrough cannot supply it. We have it on good authority that a Liege firm (L’Esperance) has just secured a British order for 4000 tons of finished iron, and that several Belgian houses are doing well in girders, &c., for England. It is thus tolerably clear—or at all events appears so—that were it not for prices the Staffordshire works would be better employed than they are, and that Belgium is having the benefit of English orders. But it is not the less evident that the more orders the British iron works will receive, the more will they be in the enjoyment of renewed activity. The producing capacity of Belgium, although recently much enlarged, is but limited, and a moderately good influx of orders must bring about two or three results, among them a rise in the price of their own iron, and an increased consumption of Cleveland (English) pig iron, which will, in turn, tend to the revivification of the British iron trade. South Wales must at present be left out of question, the wages question being extremely unsettled, and the industry really being in a state of considerable unrest. So far I have merely looked at the home market, without taking into consideration the probable wants of the Continent and of our best foreign and colonial customers. Russia first claims our attention, and at once gives ground for hope by the fact that she has just given out some good rail orders, most of which have been placed at Sheffield or Darlington. Should these be followed up by the kind of specifications and the good quantities which the Great Britain works of the Czars is known to require, an important influence will be set to work, the result of which alone may cause a revival of the Northern iron trade. Germany, as a buyer, is taking fair lots of our machinery, engines and some other goods, but does not so far manifest any decided disposition to enter into the market more largely. Sweden, Norway, Denmark and Egypt are taking from us moderately good lots of rails, and Switzerland, Spain, and the West Indies have been customers in this respect almost immediately. In addition to this there is a considerable amount doing in railroad iron, machinery for India, owing to the famine relief works undertaken by the government. Then, as a fact bearing in the same direction, British manufacturers are advised that stocks in the United States, both of iron and hardware, are extremely low, and that as soon as your finances become more settled, a considerable demand will spring up, of which the Great Britain will perform its share, seeing that you are not wholly self-sustaining as yet. Then again, Australia, New Zealand and the West Indies furnish advices which are by many regarded as hopeful, particularly with regard to the first named, which is now ordering with some freedom, and appears destined to become one of the very best customers of the parent country. These, in brief, are some of the reasons which

inspire confidence in "the undaunted breast" of the British manufacturer, and they are indisputable facts—facts which, by a rapid and fortuitous combination of events, may, as I have said, bring about an unlooked-for renewal of activity in the British iron trade. Still, it is by no means a certainty. There are many facts—obscure things these facts—which apparently point in another direction, and we all know, on Burns' authority, that

"The best laid schemes of mice and men
Often gang a-gley."

THE SCOTCH IRON TRADE

is fairly strong, so far as warrants are concerned. They are about 74/6, and makers (irregularly) quote these figures: Gartsherrie No. 1, 87/; No. 3, 78/; Coltness, 90/; No. 3, 79/; Glengarnock No. 1, 85/; Eglinton No. 1, 75/; and No. 3, 73/. More furnaces are being blown in, and the men are working at a further reduction in wages. In the bankruptcy of Hannay & Sons, iron founders, Glasgow, the liabilities are stated to be £381,195, and the total assets £213,224.

SHEFFIELD.

There is no chance of importance to note here. Messrs. Rodgers & Sons have given their razor blade forgers an advance of 4/6 per week per man, for which the men had struck at some other firm, and are still out in one or two instances. A fairly good business is doing in best razors, table knives, and traders' special descriptions of cutlery, but common kinds do not move off rapidly. The steel trade is dull, except so far as Bessemer steel is concerned, for which there are good orders in hand. Some of the local works are turning out a larger tonnage of this material than they have done for some time past. As an instance of the peculiar (!) way in which some of the host of "limited" companies were got up during the panic of last year, I may cite the Cardigan Steel, Iron and Wire Company (Limited), Sheffield, which has a nominal capital of £200,000. At the meeting of the stockholders, held last week, the directors' report showed a loss of £12,000 on the year's working, or at the rate of £230 per week! This loss was stated to be made up as follows: Forge department, £2800; rolling department, £2700; and galvanizing department, £400, with one or two minor items. It transpired that a bill for £4000 had been given already to the vendors, in payment of an amount due six months hence—in August next. The chairman attributed the loss to the rise in coal and coke, but a shareholder pointed out that that could not be so, inasmuch as they had only paid £10,900 for fuel, and had lost nearly £12,000. "Goodwill" was put down at £2000, but another shareholder alleged that "it was not worth fivepence," and the stock in trade and loose tools, "put down at £20,000, would not realize £5000 under the hammer!" After a very long and angry discussion, during which the position of the vendors (who guarantee 12 1/2 per cent. for four years) was fully and pointedly discussed, a committee of investigation was appointed to examine into the company's affairs, and report within a fortnight.

It is quite on the cards that several more of these "limiteds" will drop through, to the certain ruin of many who have invested in them. They are things of mere mushroom growth, and, in many cases, lack the most modest requisites for successful business. Hence, their fall is more a question of time than of fact.

BIRMINGHAM, STAFFORDSHIRE AND WALES.

Best Staffordshire sheets have been dropped 20/ per ton. Messrs. Baldwin, of the Whilden Iron Works, Stourport, have lowered their prices to £18 for B sheets, to £19 for B B, and to £20 for B B B. These figures are £6 lower than the quotations of April, 1873. The Cookley Company, the Hope Company, Messrs. Thompson & Hutton, and other makers, are also making a similar reduction. Prices of other finished iron are excessively irregular, bars being obtainable at £10 to £12, and there is nothing specific doing. Iron wire is lower by 1/1 per bundle, Lancashire hinges and thumb-screws 2 1/2 per cent. discount lower, and cut nails £1 per ton cheaper. Machine castings are £1 per ton lower all round. In the Birmingham and district hardware trades there is no accession of activity. A local paper says: "Orders both for home and export, but more especially the latter, continue restricted within the narrowest compass, in the belief, apparently, that a fall of prices is impending, and though a few of the larger manufacturers, more especially in the yellow metal trades, continue busy on old contracts, work is running short in several branches. It is principally merchants, however, who feel the pinch at present, as there are still sufficient arrears of unfinished orders to keep most of the manufacturers going. In all departments of the export trade the depression is very marked, and the disappointment expressed is especially keen with reference to United States orders, which at the season usually constitute one of the mainstays of our trade, but up to the present time have been of the most meager character for all descriptions of produce. Advances from the Southern United States are certainly more cheerful than they have been, and confident hopes are expressed of a good fall trade this year, more particularly if prices should come down; but, in the meanwhile, the business passing through is very scanty, and restricted to a very small group of articles. The Canadian trade continues depressed, and there is little doing with any of the West India islands, pending the restoration of order in Cuba. Some of the Central American States, including Mexico, are taking fair quantities of miscellaneous hardware, tools, guns, implements, and cheap hollow ware, and some improvement is reported in the demand from Peru and other Western States of South America, where galvanized sheets are in especial request; but, on the whole, there is no great amount of activity, and the only approach to commercial animation is in the case of the Northern States, including Russia, Denmark, Sweden and North Germany. Cape orders continue good, and the Australian market, though by no means buoyant, is still a valuable and important customer for general hardware."

South Wales is in an unsettled state—neither masters nor men feeling safe, and neither side having any faith in the continuance of the present arrangements. Both sides are preparing for a struggle, meantime the principal works are doing fairly well in rails, for which current Welsh quotations are not much over £8. 5/ per ton. In the tin plate district works continue to be closed, many thousands being now out. By the end of the month the manufacture of these goods will have totally ceased in the principality. Despite this ominous prospect, the price of tin plates has so far not hardened much.

THE METAL TRADE.

Messrs. Von Badelsen & North's circular has the following remarks: Copper, early in the week, was much inquired for, and a receipt of the telegram giving charters as 2500 tons for second half of March there was an immediate relapse to 27 1/2, which is our present quotation. Australian, Wallaroo, sold at £25; Burma, £24. English has been in good demand; tough, £28 to £29; soft, £26 to £27. Tin has been very excited, chiefly from the great advance in Holland, caused by bears covering previous sales. At one moment as high as £105 was paid for Straits, and £102 for Australian; but the market has relaxed to great flatness, and Straits is offered at £98 to £96, and Australian at £95, 20 tons having been sold at £93. In

Holland, 65 fl. at one moment paid for Banca, but closed at 57 fl. Billiton, closed 55 fl. English advanced from £25 to £26 1/2; but the smelters generally are declining to name a price, being already under contract for as much as they can deliver speedily. The 100 tons Australian on Tuesday went at £25 to £26, 10/; being from £26 to £20 advance on last sale; about 230 tons are advertised for next sale. Tin Plates—The lock out still continues, and plates generally are scarce and firm. Lead, rather easier, £20 15/ to £21. Spelter has been sold at higher prices; a sale of special output is reported at £22. 12 1/2. At the Cornish ticketing at Truro on Thursday, 1804 tons copper ore realized £2859. 1/6, being an advance of £4. 18/ per ton; fine copper, 148 tons 14 cwt. Average produce eight; average standard, £96. 3/; being an advance of £1 per ton on last sale.

The Mining Gazette gives the statistical position of Copper from April 1st, 1873, to April 1st, 1874, as under:

	Price.	Stock on hand.	Stock, including float and chartered.
1st April, 1873.	292	30,396 tons.	39,375 tons.
1st May, "	88	29,908 "	39,024 "
1st June, "	84	30,912 "	38,984 "
1st July, "	80	30,424 "	38,856 "
1st Aug. "	81	31,907 "	39,379 "
1st Sept. "	84	29,683 "	37,321 "
1st Oct. "	82	28,637 "	35,405 "
1st Nov. "	83	28,645 "	34,577 "
1st Dec. "	83	29,141 "	35,526 "
1st Jan., 1874.	84	28,592 "	35,363 "
1st Feb. "	82	29,638 "	36,006 "
1st March, "	78	29,643 "	36,493 "
1st April, "	75	29,500 "	35,908 "

Comparative positions at the same date of the past four years, with the present:

	Price.	Stock on hand.	Stock, including float and chartered.
1st April, 1870.	266	28,892 tons.	44,700 tons.
1st April, 1871.	64	34,568 "	45,177 "
1st April, 1872.	97	19,507 "	30,307 "
1st April, 1873.	92	20,296 "	30,307 "
1st April, 1874.	75	29,500 "	35,908 "

The Cornish copper ore sales for the quarter ending 31st March amounted to 13,045 tons; average produce, 7; average price per 21 cwt., £4. 1/.

IRON AND STEEL INSTITUTE.

For the following programme of the proceedings of the Iron and Steel Institute, which holds its annual meeting in London early next month, I am indebted to the *Iron and Coal Trades Review*: The proceedings will commence on Tuesday, May 6th, when there will be a meeting of the Council, after which the members of the Council will entertain the president, Mr. I. Lowthian Bell, M. P., at dinner. The general meetings will, by the kind permission of the president and Council of the Institution of Civil Engineers, be held in the rooms of that society, Great George street. Wednesday morning will be devoted to the president's address, and to formal business proceedings. For this meeting, the voting list will contain the names of about sixty-five proposed members, which shows that the Institute is still increasing its members at a very rapid rate. The Council will suggest the alteration of one of the rules, so as to allow of the election of a limited number of foreign honorary members, and we understand, if this is approved one of the first to be placed upon this list will be his majesty the king of the Belgians. In the annual report the Council will state the place selected for the summer meeting. On the evening of Wednesday the annual dinner will be held. The mornings of Thursday and Friday will be devoted to the reading and discussion of papers. The following have been already promised: Mr. C. Smith (Barrow). A visit to the principal Spathic Iron Ore districts in Europe; Mr. Maynard (New York). The Magnetites of the Lake Superior District; Mr. St. Vincent Day (Glasgow). The Wilson Process for reducing ores at once to Malleable Iron; Mr. Berryman (Leeds). Feed-water Heater; Mr. Parry (Ebbw Vale). Absorption of Hydrogen by Gray Pig Iron; Mr. E. H. Morton (Newport, Mon.). On the conditions in which Silica exists in Pig Iron; Mr. Fraser (Barnes). On the Iron Manufacturers of Southern India; Mr. A. Pye Smith (London). On Emery Wheels and their employment in shaping and dressing iron. Mr. G. J. Snelus will also read a paper, and communications have been promised by several other members, so that there will be no lack of interesting matter for discussion at the meetings. Mr. D. Kirkaldy has invited the members to inspect his new testing works at Lambeth, and doubtless arrangements will be made for doing this on one of the afternoons of the meeting. A special meeting of members will probably be held to consider the arrangements for the proposed international meeting in 1875. The Bessemer medal will be ready, in case the Council see fit to award it this year, but this cannot be decided until the meeting of that body, to be held on May 5th. We may add that each gentleman whose name appears on the voting list will be entitled to attend the meeting. From this outline of what is proposed to be done, there seems every reason to expect that the approaching annual meeting will compare favorably with any that have preceded it.

Protection for Mechanics Against Trade Union Violence.

The following is a copy of a bill lately introduced into the Ohio Senate:

A Bill to protect Mechanics and other Laborers in the quiet and peaceful pursuit of their vocations.

Sec. 1. Be it enacted by the General Assembly of the State of Ohio, That if any person or persons shall, by threats, intimidation or unlawful interference with or disturb, without authority of law, any mechanic or other laborer in the quiet and peaceful pursuit of his lawful vocations, or seek to prevent any mechanic or other laborer from obtaining work at any lawful business, on any terms that he may see fit to accept, such person shall be deemed guilty of a misdemeanor, and on conviction thereof by a court of competent jurisdiction, shall be fined in any sum not less than ten nor more than three hundred dollars, or be imprisoned in the jail of the county where the offense shall have been committed, not less than three nor more than thirty days, or both, at the discretion of the court.

Sec. 2. If any two or more persons shall combine for the purpose of depriving the owner or possessor of property of its lawful use and management, or of preventing by threats, suggestions of danger, or any unlawful means, any person or persons from being employed by or obtaining employment from any such owner or possessor of property, on such terms as may be agreed upon by the persons concerned, such person or persons so offending shall be deemed guilty of a misdemeanor, and on conviction thereof shall be severally fined in any sum not less than ten nor more than one hundred dollars, or be imprisoned in the jail of the county in which such offense shall have been committed, not less than three nor more than thirty days, or both, at the discretion of the court.

Sec. 3. If any person or persons shall enter the shop, factory, mine, or place of business of another, with intent to commit injury thereto, or by threats, intimidation, suggestions of danger, or other unlawful proceedings to cause any person employed therein to leave his employment, such

person or persons so offending shall be deemed guilty of a misdemeanor, and on conviction thereof shall be fined in any sum not less than ten nor more than one hundred dollars, or be imprisoned in the jail of the county where such offense shall have been committed, not less than three nor more than thirty days, or both, at the discretion of the court.

Sec. 4. This act shall take effect and be in force from and after its passage.

"Protection for Laziness."

Trade unionism puts on a very lamb like and virtuous face when it comes before the public to either explain or defend its principles—it hates tyranny, condemns rattenism, shakes its head seriously at coercion, and would make us believe that it is a most amiable and patriotic affair, out of which all the old vices and villainies have been completely eliminated. But though it may not manifest its feelings now in the same way it once did, we are afraid the old harsh, unreasoning, idiotically clamorous spirit remains; the principle of it is still the same; the only difference is in the mode of showing it. Here is an instance proving badness of spirit and tyranny of the clearest type, practiced not upon a master, who might have been considered "fair game," according to the catechism of unionism, but upon a working man, and actually a member of its own body. What are we about to name took place in Preston; and it came to our knowledge this week. Well, it seems that in a workshop connected with the iron trade there was a young man who thought that it was his duty to do a fair day's work for a fair day's pay—to labor properly, and avoid both idleness and carelessness. Whilst employed one day in this manner, a man in the same place sidled up to him, told him he was working too hard, that he would "spoil the shop," etc. Both of them were "in the society," only one of them cared more for fair dealing than for unionism; and the other cared more for laziness than either. The young man was surprised at the expostulation, and the manager or master, who had noticed it at a distance, went to him, and, in answer to questions, got to know what it had been about. The offender—the man who was afraid of the shop being spoiled by reasonable industry—was then remonstrated with, told that this was not the first time he had done the same thing, and for his improper interference and desire to inculcate idleness in the place, he was, at the week's end, discharged. The "society" was then informed by this jewel of a workman what had taken place; a meeting was convened; the young man was summoned to attend it; the case was gone into—the lazy man being allowed to be present, while the industrious man had to remain in another room; and ultimately the latter was called in and told that the property of expelling him from the society had been thought of as a fitting punishment for what he had done, but that this idea had been abandoned, and he must pay a fine of £1! The young man refused to pay the money, and will, we believe, leave the society rather than submit to its tyranny and extortion. So much for trade unionism, which, in this case, practically means protection for idle, loafing, dishonest men, and punishment for those who conceive it to be their duty to work industriously and discharge their duties properly. Some societies adopt as a motto—"Protection for labor;" but this one ought to have painted upon its banners, in conspicuous letters, the delightfully soothing axiom—"Protection for laziness."—*Preston Chronicle*.

Another Danger from Artificial Heat in Winter.

If people believed all the doctors tell them about the evil effects of artificial heat upon the human system, the probabilities are they would dispense with furnaces and heaters, and depend upon furs and flannels to keep them warm in winter. The latest warning of danger comes from a writer in the *Louisville Courier-Journal*, who makes a great deal out of very little, we think, which is probably due to the fact that topics for discussion are not very plenty just now. The writer recalls the fact that Professor Loomis, some years ago, in a series of scientific papers, called attention "to the effect of the friction of shoe leather on woolen carpets, in houses warmed by hot air furnaces or steam, in cold weather, in the production of negative electrical excitement," and he quotes from a book of Professor Stillman the assertion that the young people in the Professor's house found a source of amusement in cold weather in giving electrical shocks (by kisses and other wise) to unwary friends, or in lighting the gas by a spark from the finger or a key handle after rubbing it briskly over the carpet. An anecdote of a lady in Frankfort, Kentucky, who was able to light the gas by applying her knuckle to the burner, finishes the writer's stock of illustrations that electricity in large quantities enters into our systems, under certain conditions, when we are merely following the routine of our every day lives. He then says: "It is possible that, amid the learned labors which are going on touching the remedial uses of this powerful but dangerous agent, the inmates of tens of thousands of American houses are being left to a baneful influence of it which is receiving no attention."

"The physiological effects upon a child frolicking upon a carpet, in a furnace heated or steam heated house, or upon a lady traversing the house in her domestic duties, until charged with electricity sufficient to give a sensible shock to persons touched, or to ignite the gas, may be judged somewhat by the effects upon a boy on a stool isolated by glass legs, and electrified until able to ignite a cup of ether presented to his knuckles. He experiences a prickly heat and glow of the skin, his face flushes, his hair stands out from his head, he breaks into perspiration, a touch gives him a shock like touching the conductor of the electrical machine in action, and he feels afterward a lassitude like that subsequent to a strain of the muscles or excit-

ment of the nerves of sensibility. When persons, young or old, are subjected to such a process almost daily for a long season, and often a number of times in a day, until it be without serious effects, for good or evil, upon the health and constitution? When it is considered that a person electrified in this manner is not like the Leyden jar which gathers and holds the electricity, but is like the electrical machine constantly discharging the electricity silently in the atmosphere, the presence of such an amount at any one moment suggests how great a quantity must be emitted by a single person in such circumstances in a single day. Gathered into a battery of jars and discharged at once through a large animal, it would probably kill instantly, or would shiver a tough block of wood an inch in thickness. The statement of its chemical effects, although small comparatively to its mechanical effects, and to the effects of electricity in other forms, could be made equally startling.

What now must be the influence of such an agent, experienced in such measure, upon the physical health and mental constitution of those daily subjected to it? The children in such homes encounter not merely the general enervating influence of luxury, but even a more formidable foe to health and intellectual strength. Compare that pale, precocious boy in your furnace heated house with the bare footed, ruddy cheeked boy in the laborer's cabin, or in the less luxurious country home. The difference is not all in the softer clothing and gentle rearing of your boy; upon his nerves a subtle and powerful agent is almost continuously at work to excite his sensibilities and waste his strength. Observe the distress that, with attention, may be read upon the face of the fretful child in your electrical hot bed, and give it the relief which nature craves, in the unadulterated air outside your doors."

If the writer of this communication had ever tried the experiment, he would have found that the electrical phenomena noted as the result of the friction of leather soles upon carpet, are produced as readily in a cold room as in one warmed to a comfortable temperature by furnace heat. We have often so found it in our own experience, and have never experienced any unpleasant sensation or effects from lighting gas with our knuckles any number of times.

Drainage for Health.

A writer in the *Sanitarian* says:

The proper drainage of cellars is a matter of great importance. Buildings may be wet, stables not very dry, water may drip from the eaves, cutting holes and making puddles. The water from such puddles filters directly in the cellar, so that old houses in the country are very frequently dangerous to life on account of the water settling into the cellars. A damp cellar may sometimes be made dry by making a sink in it, as already described for the fields. Cellars are sometimes made in such wretched places that they need drain pipes to carry off the water. In arranging any of this kind of work about a stable, it is necessary to be careful that the drainage of the stable do not filter into any water required for domestic use. Water should on no account be allowed to drip from the eaves. It is a great nuisance, undermining foundations and rapidly destroying buildings.

Air confined anywhere, even in a clean room, becomes offensive, probably unhealthy, with a disagreeable smell of closeness, and confined with filth in a drain or sewer it must be infinitely worse. Drains built tight, with traps etc., so that there is no ventilation of their interior, generate very poisonous gases, which are ready on the occurrence of any small leak, to escape and poison everybody who happens to go near them. The best arrangement for ventilators in houses, is to have a separate flue built in the chimney stack to receive the ventilator pipes. Thus the air from the drain is discharged high in the atmosphere in a position to be mixed with smoke, and the noxious properties are destroyed, the smoke, whether of wood or coal, containing about the best chemical disinfectants known.

In all parts of New England hundreds of people are dying every year of typhoid fever; a large tract of the city of Boston is now building on made land, nearly as flat as the prairies about Chicago, and in a few years it will doubtless have to be regraded and rebuilt to get rid of the pestilence. From Maine to Pennsylvania there are flat undrained fields, and wet cellars, nearly as bad. All over the country further south, but principally in the Mississippi Valley and the flat country bordering the ocean, the half drained land is infected with intermittent fever and the other malarial pestilence to such an extent as to destroy many thousands of people every year; so that, in spite of constant immigration, extensive tracts of country are as sparsely peopled as they were when Pocahontas saved the life of John Smith.

The Duties of Engineers.

In our larger manufactories it is the custom to employ an engineer to run the steam engine, and to have general supervision of the boilers, and man or men acting as firemen and water tenders. The engineer is expected to be familiar with the condition of pumps, safety valves, and water in the boilers at all times. This is not only expected, but should be required. The proprietors of mills cannot personally supervise all these matters, but they can employ competent talent to do so, at a reasonable price. Now there are two grand difficulties in the use of steam-power which can be, and should be, entirely removed. First, the tendency of steam users to employ incompetent men as engineers from motives of economy. Not being familiar themselves with the properties of steam, they think that almost any sane man can, in a short time, fit himself as an engineer. He must begin as a fireman, and after acting in that capacity for a few months, he is promoted to the position of engineer. His duties now are to "mind" his engine, and see that the fireman gives him steam enough to run it well, and by it the machinery in the manufactory. Now, it has not, perhaps, occurred to the steam user that efficiency in the

boiler room is of great importance to him, really of more importance than a simple engineer (we do not intend here to speak disparagingly of faithful engineers, as will be seen further on), for upon the proper feeding and firing of the boilers depend their whole safety and efficiency. How important then that there should be good sound sense and intelligence in and about the boiler room. The question will arise, is it necessary to employ men of talent to shovel coal and pump water? We answer, no, these duties can be performed by men of little talent and large muscle. How then is coal shoveling, ability and intelligence to be combined? This brings us to the second difficulty, viz.: The unfaithfulness of many engineers, who are without doubt, so far as ability goes, fully competent, but who neglect their duties, and leave important matters in the hands of ignorant men. The life of an engineer seems an easy one. He sits up his engine, keeps it clean, and seems to be occupied with little else. A faithful engineer will know all about not only his engine, but his boilers. He will see that the safety valve is in working order daily and hourly—that the pump valves work well—that the firing is not too fierce, and that the water is carried at the proper level, neither too high nor too low; all these matters are important and require constant attention. An engineer may be well informed, understand perfectly every part of his engine, and yet be a very dangerous man to employ on account of his unreliability or laziness. Serious accidents have occurred where the engineer had the reputation of being fully competent to fill the position. An engineer's time will be all occupied if he is faithful to his trust, and no man should assume such responsibilities unless it is his intention to be faithful. An engineer's position is a very important one to the manufacturer, and a faithful man should be well paid.—*Locomotive*.

Correction.

PHILADELPHIA, May 12th, 1874.

To the Editor of *The Iron Age*: We notice in your last issue of *The Iron Age*, a letter from Schuykill Valley, signed W. E. C. Coxe, Reading, Pa., in which he reports our Rolling Mills, at Conshohocken, Pa., stopped. In this Mr. Coxe is mistaken, as we have not stopped our works, but have been running steadily night and day for over twenty years, and expect to keep on running as usual. Your will oblige us by correcting Mr. Coxe's statement.

Yours truly,
J. Wood & Bros.

Base Ball.

A game of base ball was played on Saturday, the 9th inst., at Camden, N. J., between the employees of the Russell & Erwin Mfg. Co. (Philadelphia house), and those of the Biddle Hwd. Co., which resulted in favor of the former by the following score:

R. & E.	O. R.	B. Hwd. Co.	O. R.
Fox, r. f.	3	Watson, s.	3
Hetzel, p.	2	Watson, s.	2
Faunce, s. s.	4	Marshall, 3d b.	1
Wilson, l. f.	3	Huff, c. f.	3
N. Norden, c. f.	3	McKee, c.	3
J. Terry, 2d b.	2	Bush, 1st b.	2
E. Norden, c.	0	Miller, l. f.	3
W. Terry, 3d b.	2	A. Huff, p.	2
Livezey, 1st b.	2	Middleton, r. f.	3
Total	21	Total	27
Innings	1 2 3	4 5 6 7 Total.	
R. & E.	3 11 3	7 5 0 3-Total.	
B. Hwd. Co.	6 3 3	8 3 0 4-27.	

Umpire—Wm. Kromer.

HARRISBURG & BRITAIN.

For Sale, &c.

FOR SALE.

A clean and complete stock, (say \$8000 to \$10,000 worth) of **Hardware, Agricultural Implements, and Paints and Oils**, with the good will of a well established cash business in one of the most substantial and rapidly growing towns in New England. The present owner desires a change solely for reasons of a domestic nature, and offers, to a young man with capital, an opportunity seldom presented. Address,

"EVERETT,"

Care Box 1073, Boston, P. O.

Narrow Gauge Tank Locomotive FOR SALE.

2 ft. gauge, suitable for quarry or blast furnace use. Weight 9 tons, cylinders 9x12, steel tyres, black walnut cab, &c. Everything fitted up in first-class style, entirely new. Address,

WARD, STANTON & CO., Newburgh, N. Y.

IRON FOR SALE.

Manufactured by the **ULSTER BLAST FURNACE, NAPANOH, N. Y.**

Samples and prices with, **M. M. PILLSBURY, 85 John St., N. Y.**

Valuable Iron Works, For Sale.

The undersigned offers for sale the Iron Works in Pottsville, Schuylkill County, Pa., known as "The Washington Works," consisting of a

Large Stone Machine Shop & Foundry, Brick Pattern House, Erecting Shop, Stone Blacksmith Shop, Brick Office, and Lot of Ground containing in front 195 feet 3 inches, and in depth 260 feet.

There will be sold with the above a large and valuable collection of Patterns, Heavy Crane Flasks and Heavy Core Spindles for making heavy Castings and Pipes of all sizes; Turning and Planing Tools. The Works can be put in immediate operation. A favorable opportunity is here presented for enterprising men. The demand for Castings and Machinery is constantly increasing in this region. The property will be sold on liberal terms. If not sold in a reasonable time it will be for Rent.

For particulars apply to
J. W. ROSEBERRY, Trustee, Pottsville, Pa.

Iron Work for the Fourth Avenue Improvement.

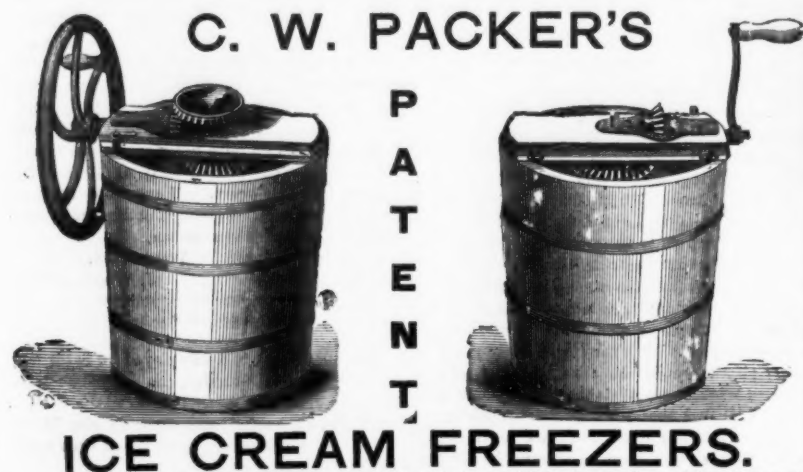
Messrs. Charles Toupe & Co., of the Lexington Iron Foundry, 88th street, near Fourth Avenue, in this city, are busily engaged upon a contract for iron work for the depots of the Fourth Avenue improvement, now pushing rapidly forward under the direction of Messrs. Dillon, Clyde & Co., contractors. The contract includes columns, brackets, stair strings and risers. Each of the five proposed depots will have 26 columns, averaging 11 feet 6 inches long by 10½ inches diameter, and weighing about 1350 lbs. Messrs. Toupe & Co. had already cast one hundred of these columns up to the end of last week, without losing one from any cause—a fact of which they are very proud, and with good reason. The castings are very smooth and beautiful, requiring but little finishing, with sharp angles and free from defects. Mr. Charles Toupe is a practical founder of large and varied experience, and many of our readers will remember his cast iron model of our new Masonic Temple, which received a premium at the last fair of the American Institute. The establishment is very small and unpretentious, but it enjoys the advantage of being always busy filling orders for the best class of work.

File Manufacture at Cleveland, Ohio.

The Cleveland Commercial Review gives the following interesting description of the Globe File Works of that city:

In March last, Mr. W. G. Palmer, for a number of years one of the proprietors of the Forest City File Works, of Cleveland, dissolved his connection with that establishment, and as soon as practicable thereafter, renewed his

connection with this branch of trade by establishing the Globe File Works, at Nos. 66 and 68 Center street, and having associated with him Mr. Ira Benton, the style of the firm was made that of W. G. Palmer & Co. The new firm equipped their works with all the most improved machinery, and with every required facility, and began active operations in April, with the most favorable promise, notwithstanding the general dullness of the times. The purpose of this establishment is to manufacture an article superior to any thing in the line of files and rasps made in this market, and equal to the best English production, and even thus early in the career of the firm the trade has begun generally to recognize this fact. To the full accomplishment of this purpose, the firm secured the services, as superintendent, of Mr. J. Beebe, late of Stubbs' works, England, a most thorough mechanic in this branch, and his experience and knowledge will be supported by every effort on the part of the firm in the employment of the very best material, and in providing every condition to perfect work. The works occupy a two story building 166x40 feet, with a capacity for working forty hands, and turning out a ton of goods per month. The market for the product of the works extends throughout the country, and with the experience and careful management which Mr. Palmer brings to the business, its permanent success and liberal prosperity is assured. Already the firm has booked orders enough to keep the works actively employed for some time to come, and as the reputation of their goods becomes more widely extended, which it is certain to do, it cannot be doubted that at no remote period their facilities will be taxed to the utmost. We take great pleasure in noting the establishment of new and substantial enterprises of this character, which add to the industrial energy and consequently to the prosperity of our growing city.



C. W. PACKER'S PATENT ICE CREAM FREEZERS.

These Freezers have been in use since 1860, with the most flattering results, and they have well earned the reputation of being the **BEST ICE CREAM FREEZER** ever introduced. A large number of Testimonials might be offered in recommendation, but the fact that they are now sold by the leading houses in all the principal cities in this country, and also numbers of them are exported every year, is a sufficient guarantee of their excellence. They are made in the most durable and substantial manner, none but the best materials are used in their construction, and the mechanical arrangements are such that they will freeze Cream, Fruits, or Water Ices, in the shortest possible time.

DOUBLE ACTION FREEZER.

SIZES AND PRICES.	
10 quart.....	\$15 00
15 ".....	20 00
20 ".....	25 00
25 ".....	30 00
30 ".....	35 00
35 ".....	40 00
40 ".....	45 00
45 ".....	50 00
50 ".....	55 00
55 ".....	60 00
60 ".....	65 00
65 ".....	70 00
70 ".....	75 00
75 ".....	80 00
80 ".....	85 00
85 ".....	90 00
90 ".....	95 00
95 ".....	100 00

For sale in New York at minimum prices by Wholesale Dealers in House Furnishing Goods generally.

CHARLES W. PACKER, Manufacturer, Philadelphia.

COG WHEEL FREEZER.

SIZES AND PRICES.	
2 quart.....	\$3 50
3 ".....	4 50
4 ".....	5 50
5 ".....	6 50
6 ".....	7 50
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95 ".....	96 50
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98 ".....	99 50
99 ".....	100 50



Having great facilities for doing cheap work as well as costly, using Waymouth's variety turning lathe, which in many kinds of work will lessen the cost at least one-half, we are prepared to furnish patents and dealers with finished work in quantity.

Many & Marshall,
48 Warren St., N. Y.

SASH CHAIN.

BUILDERS' HARDWARE,
Chain and Pulley for Heavy Sash
THE BEST & CHEAPEST MADE.
Pure Bronzed Metal and Hand-Plated Knobs, Hinges, &c.
Agents for Trenton's Black Lead Crucibles.
Agency and Depot of the TRENTON LOCK COMPANY.

THOMAS MORTON,
Manufacturer of

Brass & Copper Chain,

And patented attachments for same, for suspending windows, from 100 to 1500 lbs. Sashes can be suspended with my Chain and attachments in a shorter time and with less trouble than by using the ordinary common cord. I am now offering the Chain and fastenings cheaper than any other in the market. Also manufacturer of the MORTON & BRENNER'S Straight and Circular Spring Balances. Established in 1842.
Office, No. 15 Murray St., N. Y.



The jaws of **BARBER BRACES** are now made of Cast Steel. This, with other recent improvements, makes them by far the best Brace in market. We are willing to meet prices other manufacturers when their goods are made equal to ours. If cheap goods are wanted, our No. 22 and 23 Braces will meet that demand, as we will guarantee them to be better than any other Brace in use, except our first quality. We have made two styles of **Ratchet Braces**, which have been largely sold, and now have a third kind nearly ready which we think is better than either of the others.

Our **BREAST DRILLS** have a chuck with Steel jaws, which will hold round twist drills up to half inch, and will also hold equally well, auger bits with shanks of any shape. The demand for these **BREAST DRILLS** has been so large, that we have not been able to accumulate a stock, but can put in a few with each brace order if wanted.

MILLERS FALLS CO.,

78 Beekman Street, New York.

ALSO MANUFACTURE

Parallel Vises, Glass Cutters, Iron Cutters, &c.



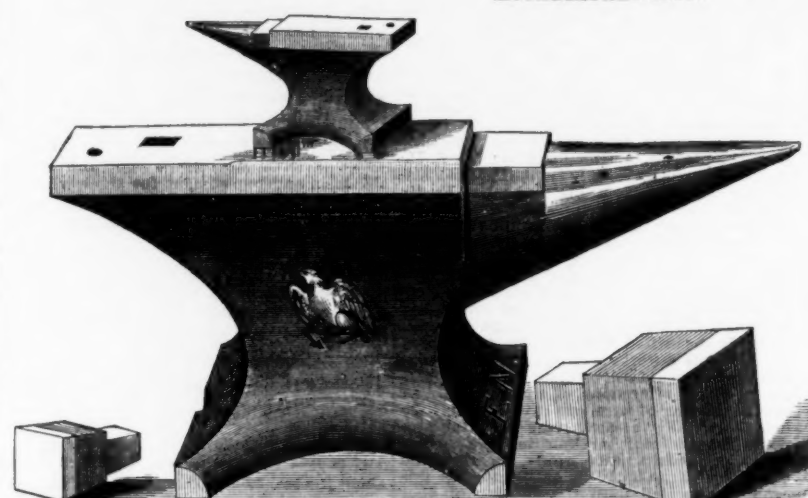
RUSSELL & ERWIN MFG. CO., New York and Philadelphia, Agents.

NOTICE.

These Vises are only manufactured at the **HOWARD IRON WORKS**, at Buffalo, N. Y. and are so stamped. The improvements in these Vises which are patented are valuable, and parties who claim to manufacture, and are offering a Vise representing it to be the same as the **HOWARD VISE**, are deceiving the Trade.

The Fisher & Norris Eagle Anvil Works.

(ESTABLISHED 1843.)



FISHER & NORRIS manufacture also, to special order, Anvils for Saw Makers, File Makers, Axe Makers, &c.; also, Copper Smiths', Silver Smiths' and Tin men's Stakes and Blocks, with hardened and polished cast steel faces, and the well known Double Screw Parallel Vise.

REDUCED PRICE LIST, November 1st, 1873.

ANVILS weighing 100 lbs. to 800 lbs., 11 cts. per lb.									
Smaller Anvils, ("Minims.")	1	2	3	4	5	6	7	8	9
No. 0	15 lb.	20 lb.	30 lb.	40 lb.	50 lb.	60 lb.	70 lb.	80 lb.	90 lb.
Weighting about 10 lb.	\$4 25	\$5 00	\$5 50	\$6 50	\$7 00	\$8 00	\$9 00	\$10 00	\$10 50
Price, \$3 50									

THESE GOODS ARE SOLD BY OUR AGENTS (with special discounts to the trade).

New York.—Messrs. CLARK, WILSON & CO.—RUSSELL & ERWIN MANUFACTURING COMPANY.—Messrs. HORACE DURRIE & CO. Boston.—Messrs. GEORGE H. GRAY & DANFORTH. Philadelphia.—Messrs. JAMES C. HAND & CO. Baltimore.—Mr. W. H. COLE.

FISHER & NORRIS, Trenton N. J., Manufacturers.

MALTBY, CURTISS & CO., Waterbury, Conn.,
Manufacturers and Sole Proprietors of

CAPEWELL'S GIANT NAIL PULLER.



Reasons why you should Use the Nail Puller.

1st. The edges of the boxes are never split or injured. 2d. No broken Nails in the box or cover. 3d. The box and cover remain sound for future use. 4th Nails are drawn without breaking or bending. 5th. The box can be opened in half the time required by the old method with chisel or crane. Send for prices, and other information, to our Salesroom.

No. 62 Reade St., N. Y.

E. C. C. KELLOGG

PATENT.

Feb. 13, 1866.



COMBINATION BELT PUNCH,

Pronounced by those who have used them the handiest and most desirable tool in use of its kind. As will be seen, the combination consists

of BELT PUNCH, KNIFE AND AWL.

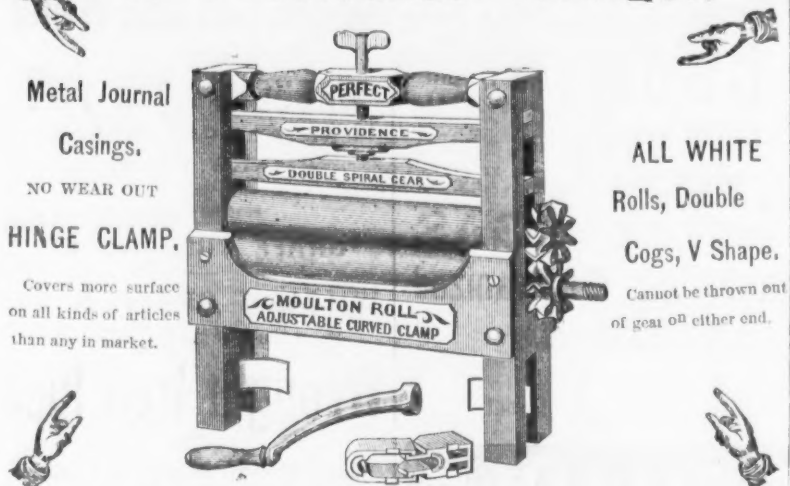
Also, Needles for Lacing Rubber Belting, so combined that each tool does its specific work and not interfere with either of the others.

E. C. C. KELLOGG & CO., Hartford, Conn.

For Sale Wholesale and Retail by **ETNA NUT COMPANY**, 97 Chambers Street, New York.

PROVIDENCE TOOL CO..

The Providence Wringer.



H. B. NEWHALL, Agent, No. 11 Warren St., N. Y.



WM. H. HASKELL & CO.,

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Manufacturers of

Coach Screws (with Gimlet Point),

all kinds of

Machine and Plow Bolts,
FORGED SET SCREWS AND TAP BOLTS.



Warerooms, No. 11 Warren St., New York, H. B. NEWHALL, Agent

Address your Orders to H. B. NEWHALL, Agent, No. 11 Warren Street, N. Y.

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Celebrated Coal and Wood Cooking Stove.

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SOLD BY ALL DEALERS.

The Largest First Class Stove in the Market.

The Best Made and Finished Stove in the Market.

The only perfect Reservoir Stove in the Market, boiling hot water in twenty minutes.

For soft coal, has front feed and iron lining.

BURDETT, SMITH & CO.,

253 River Street, Troy, N. Y., or
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WHOLESALE

HARDWARE HOUSE,

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HARDWARE FACTORS.

BATES' MANUFACTURING CO.'S GOODS.

Bonney's Pat. Hollow Augers & Spoke Trimmers.

Bonney's Patent Double-Edged Spoke Shave.

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625 Market Street,

PHILADELPHIA.

The Finest Machinery Oils,

Combined from Sperm, Tallow and Lard Oils, and suitable for all machinery, are now being furnished to consumers at from 40 to 75 cents per gallon, by WM. F. NYE, New Bedford, Mass. His famous SPERM SEWING MACHINE OIL received the highest award at the Vienna Exposition.

MILES ALARM TILL CO.,

The Oldest,
Largest and only
Incorporated Alarm
Till Co. in the
World.



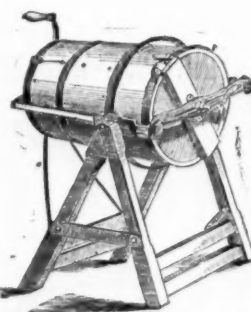
Providence, R. I.

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and Circulars.



"The BEST in the WORLD!"
BLATCHLEY'S
Horizontal Ice Cream Freezer,
(Tingley's Patent)

For Saloons, Hotels, Ice Cream Manufacturers, or Families.
STANDS ENTIRELY UNRIVALED!

With the aid of this Freezer a most delicious dessert of Ice Cream, Water Ice, or Frozen Fruits, Custards, &c., may be frozen in from five to eight or ten minutes, at the will of the operator, with almost no trouble and but trifling expense. It is acknowledged the "Best Freezer in the World," and a luxury no family should be without. The Closed Head will save Ice enough in one season to pay for the Machine. The Tub requires but one filling to freeze. Sizes 3 to 40 quarts. For sale by the trade generally.

Trade Discount liberal. Applications should be accompanied by business card.
CHAS. G. BLATCHLEY, Manufacturer, 506 Commerce St., Philadelphia, Pa.

THE READING BOLT & NUT WORKS.



J. H. STERNBERGH

READING PA.

Manufacturer of all kinds of

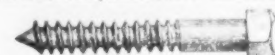
Machine Bolts, Bolt Ends,

RODS for Bridges & Buildings,

HOT PRESSED NUTS,

Washers, Coach Screws, Refined Iron, &c.

Manufacturing my own stock of iron, I am able to control quality, and fill orders promptly, with a very superior article, at the lowest possible price. Send for Price List.



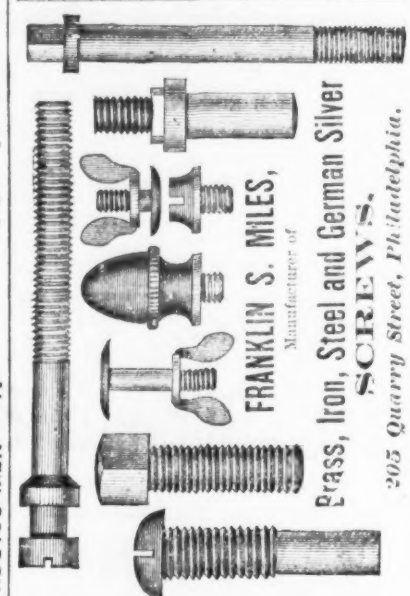
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J. AUSTIN & CO.,

168 Fulton Street, N. Y.

SOLE AGENTS FOR

SCRIPTURE'S OILERS.



Jos. Scheider & Co

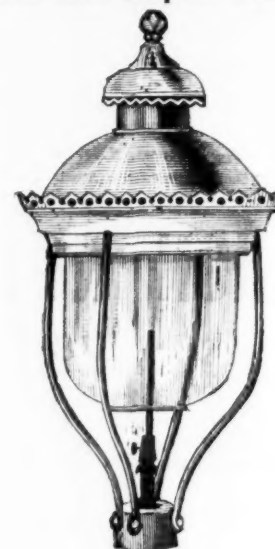
Manufacturers of

Japanned & Stamped

TIN WARE,

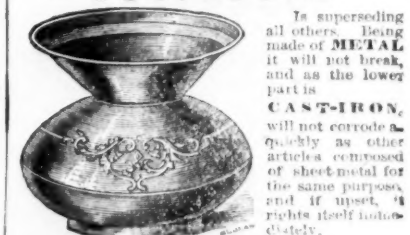


MINER'S PATENT
Street and Depot Lamps.



PATENT SELF-RIGHTING CUSPADORES.

THE PATENT SELF-RIGHTING CUSPADORE



58 Beekman St., N. Y.
P. O. Box 4291, New York.
FACTORY PORTLAND CONN.

Pipe, Fittings, &c.

Thomas T. Tasker, Jr.

Stephen P. M. Tasker

MORRIS, TASKER & CO.,

PASCAL IRON WORKS, Philadelphia,

TASKER IRON WORKS, New Castle, Del.,



Office, Fifth and Tasker Streets, Philadelphia.

Office and Warehouse, No. 15 Gold Street, New York.

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MANUFACTURERS OF

WROUGHT IRON WELDED TUBES,

Plain, Galvanized and Rubber-Coated, for Gas, Steam and Water.

Lap-Welded Charcoal Iron Boiler Tubes.

Oil Well Tubing and Casing, Gas and Steam Fittings, Brass and Steam Fitters' tools, Cast Iron Gas and Water Pipe, Street Lamp Posts and Lanterns, Improved Coal-Gas Apparatus, Etc.

The Billings & Spencer Co.,

MANUFACTURERS OF

The Billings Patent Solid

SEWING MACHINE SHUTTLE.

ALSO,

The Barwick Pipe Wrench.

And all Descriptions of STEEL and IRON

DROP FORGINGS

For Machine Handles, Lathe Wrenches, Milling Machine Cranks, Thumb Screws, and parts of Guns, Pistols, Sewing Machines and Machinery Generally.

We also manufacture, to order,

Cap, Set, Machine & Gun Screws, of Iron, Steel or Brass.

* Price List and "Cuts" of Goods manufactured by us sent to any order on request.

BILLINGS & SPENCER CO.,
Lawrence Street, Hartford, Conn.Miller's Patent Combined Plow,
Filletster & Matching Plane.

2500 ALREADY IN USE.

Manufactured by the

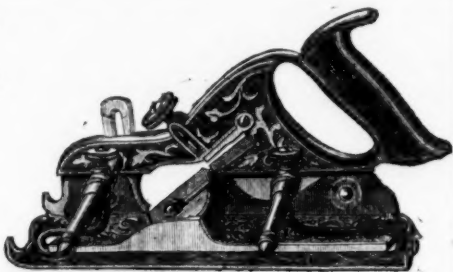
Stanley Rule & Level Co.,

NEW BRITAIN, CONN.

Warerooms:

35 Chambers Street, NEW YORK.

Send for Descriptive Circulars.

**UNION NUT CO., New York,**

78 Beekman Street,

Agents for

HART'S PATENT SAW SET.

(CUT 1/2 SIZE.)

Upon trial will be found to be the most powerful and simple Saw Set ever offered to the public. Care has been taken to make the parts of the best material, and of proper proportions to give the greatest strength. It is made of the best Malleable Iron, except the Set Lever, which is of the best Cast Steel, and properly tempered.

DIRECTIONS FOR USING.

Adjust the Brass Gauge to the tooth to be set; then adjust the top gauge by means of the screw on the top until the gauge rests solidly on the saw blade. It will be readily seen that more or less Set can be given to the Saw by turning the set screw up or down.

Pipe, Fittings, &c.

McNab & Harlin Mfg. Co.,

MANUFACTURERS OF

BRASS COCKS

For STEAM, WATER and GAS.

Wrought Iron Pipe & Fittings, Plain and Galvanized
PLUMBERS' MATERIALS.

Illustrated Catalogue sent by express to the Trade on application.

Factory, Paterson, N. J.

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PANCOAST & MAULE
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PHILADELPHIA.**WROUGHT IRON PIPE**FITTINGS, BRASS & IRON VALVES & COCKS
TOOLS & STEAM FITTERS SUPPLIES &c.

PIPE CUT & FITTED TO PLANS FOR MILLS &c.

SUCCEED MORRIS TASKER & Co. AS

CONTRACTORSFOR HIGH & LOW PRESSURE STEAM HEATING
APPARATUS FOR ALL CLASSES OF BUILDINGS.

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National Tube Works Co.,

BOSTON, MASS. and McKEESPORT, PA.,

MANUFACTURERS OF

Best Quality Lap Welded Iron Boiler Tubes,

STEAM AND GAS PIPE,

Artesian Oil and Salt Well Tubing and Casing,

With Patent Protecting Coupling;

Mack's Patent Injector for Feeding Boilers.JAMES C. CONVERSE, President,
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EATON & COLE.

Manufacturers of

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Fittings,BRASS
VALVES,

COCKS, TOOLS, &c.,

38 John Street, NEW YORK.

Sole Agency for the Pacific Coast for

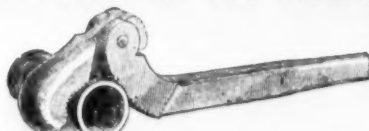
Register's Patent Gauge Cocks,
CONROY, O'CONNOR & CO.,
San Francisco, Cal.**CAST IRON PIPES**

FOR WATER AND GAS.

Branches Retorts, &c.

Warren Foundry & Machine Co.,
PHILLIPSBURG NEW JERSEY.

WHEATCROFT'S

SELF-ADJUSTING PIPE WRENCH.

Forged from Best Tool Steel.

The dog is solid over the head of the lever bar, taking the strain off from the pin.

Each Wrench takes four Sizes of Pipe.

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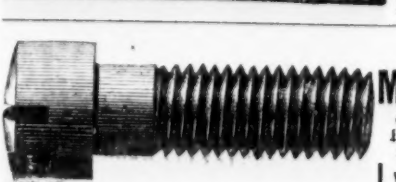
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Jenkins' Patent
Compression
Valves

AND

Gauge Cocks

Also,

Nelson's Patent
LUBRICATOR.Warranted the most
reliable and durable
in the country.**THE CHARLES GREGG**

MANUFACTURING CO.

BRASS WORK of all kinds,

FITTINGS FOR

Steam, Gas and Water

PLAIN AND GALVANIZED

WROUGHT IRON PIPE,Nos. 62 & 64 Gold Street,
NEW YORK.Business Established, 1836. Incorporated, 1872
Send for Price List.**GRAFF TUBE WORKS.****WILLIAM GRAFF & CO.,**

Manufacturers of Plain and Galvanized

Wrought Iron Pipe

For

Gas, Steam, Water, Oil, &c.,

No. 140 First Ave., PITTSBURGH, PA.

Pipe of any Size, Length or Thickness furnished to order.

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Sole Manufacturers of

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Pumps, Water Closets, Fountains,

Vases, &c.

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106, 108 & 110 Centre Street,

Factory, Mott Haven, New York.

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Manufacturer of Patent

Brass Spring Pad Locks

FOR

Railroad Switches,

Freight Cars, &c.

Cor. Broadway & Kossuth St.

Brooklyn, E. D., N. Y.

F. C. HUCHTHAUSEN,

Special Partner.

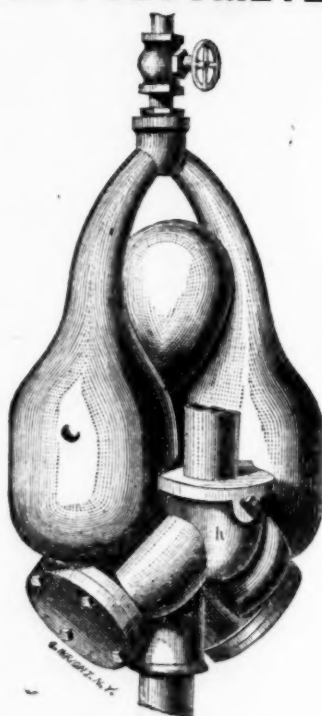
**ROMER & CO.,**

Established 1837.

Manufacturers of Patent Brass Pad Locks for
Railroads and Switches. Also, Patent
Stationary R. R. Car Door Locks. Patent Plan
and Sewing Machine Locks.

141 to 145 Railroad Avenue, NEWARK, N. J.

Illustrated Catalogues sent on application.

THE PULSOMETER.The simplest, most durable and effective Steam Pump
now in use. Will pump gritty or muddy water, without
wear or injury to its parts. It cannot get out of order.

BRANCH DEPOTS.

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511 & 513 North Second St., St. Louis, Mo.**C. HENRY HALL & CO.,**

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TURNED MACHINE SCREWS,

One-sixteenth to five-eighths diameter.

Heads and points to sample.

IRON, STEEL and BRASS.

Lyons & Fellows Mfg. Co.,

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The Iron Age Directory

and Index to Advertisements.

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Agricultural Steels and Irons, etc., Makers of.

Albany, N. Y., J. & Co., Pittsburgh, Pa.

Alarm Tills.

Albany, N. Y., J. & Co., Pittsburgh, Pa.

Amvils, Manufacturers of.

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Fire Brick, Makers of.

Brooklyn City Retort and Fire Brick Works, Van

Dyke, St., Brooklyn, N. Y.

Hall A. & Sons, Perth Amboy, N. J.

Kreischer H. & Co., 58 Goerck, N. Y.

Newkumet Philip, 264 and Vine, Phila.

Palmer, Newton & Co., Albany, N. Y.

Salamander Works of Woodbridge, N. J., foot of

Bethune St., N. Y.

Watson John R., Perth Amboy, N. J.

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Meyers Mfg. Co., 200 Centre, N. Y.

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Cowdin Mfg. Co., 113 Chambers, N. Y.

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Murphy & Kelzer, Baltimore, Md.

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Liberty Marshall Jr., 90 Beekman, N. Y.

Whitman S., Greenport, L. I.

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Machinery, etc., Makers of.

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Machine Screws, Makers of.

American Screw Co., Providence, R. I.

Lyons & Fellows Mfg. Co., Williamsburg, N. Y.

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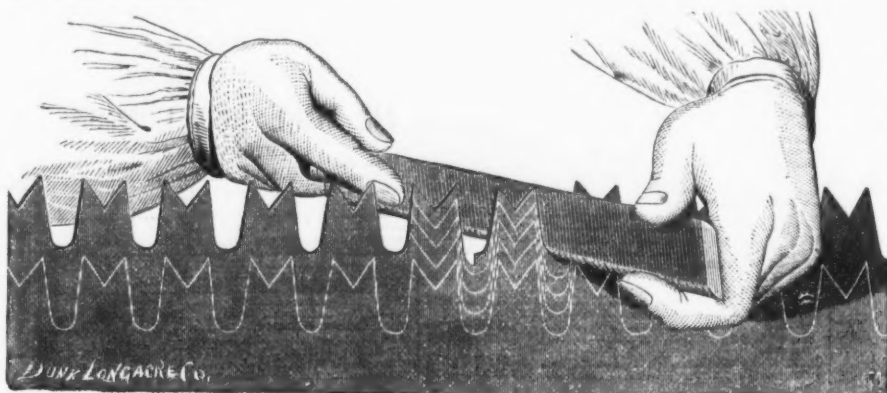
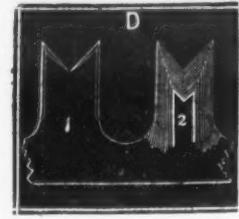
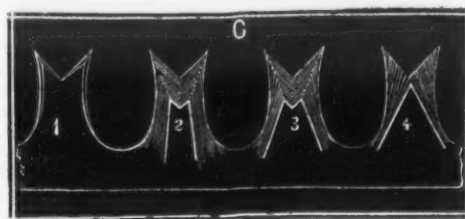
ATTENTION!! HALT!!

IMPORTANT to Hardware Dealers, Lumbermen, and all Parties interested in Cross-Cut Saws.

We desire to call special attention to our various styles of Cross-Cut Saws represented in this week's issue. In the manufacture of all our Fast Cutting Saws, we have carefully avoided the pernicious and destructive practice of making **UNDER-CUT TEETH**.

All saws made on this principle are miserable failures. It is simply a rip tooth to the purpose of cross cutting, an idea which has been long ago exploded. To get an **UNDER CUT**, the tooth must be wider at the extreme point than at any other part, and each successive filing must result in rapid reduction in the width and ultimate loss of shape, as shown in the annexed diagrams:

No. 1, Fig. C, represents the undercut tooth as it leaves the factory; Nos. 2, 3 and 4, Fig. C, shows how No. 1 must ultimately become under any style of filing that may be adopted. No. 1, Fig. D, shows a tooth with parallel edges, and No. 2, Fig. D, shows the shape of said tooth after several filings. The white line on the diagrams represent the successive cuts of the file.

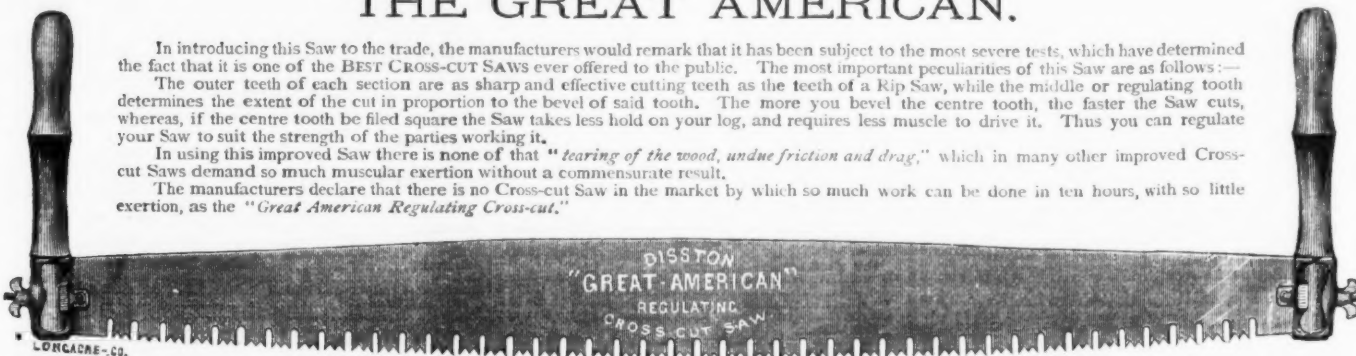


On the other hand, the annexed engraving represents a section of Lumberman Cross-Cut Saw, with File specially adapted for keeping said Saw in order. By using the File here illustrated, with the edge made to fit the gullet or space between the teeth, and pressing downward while filing, you will preserve the original shape of the teeth as described by dotted lines and notch in engraving. You pay for the edge of the file as well as the flat—then why not use it? and thus keep your Saw always gummy and in order, and avoid the risk of breaking or buckling the Saw by the old method of gumming.

This File is manufactured expressly for the purpose of keeping in order the teeth of our Improved Saws, known as the Climax and Lumberman, and can be used with equal facility on either Saw. If the file be used according to our instructions, viz.: pressing down in the gullet at the same time the edge of the tooth is being filed, the effect will be so convincing that persons will never return to the use of the old style File, or any other of the so-called improved teeth. We also manufacture a File for keeping the Great American and Climax in order.

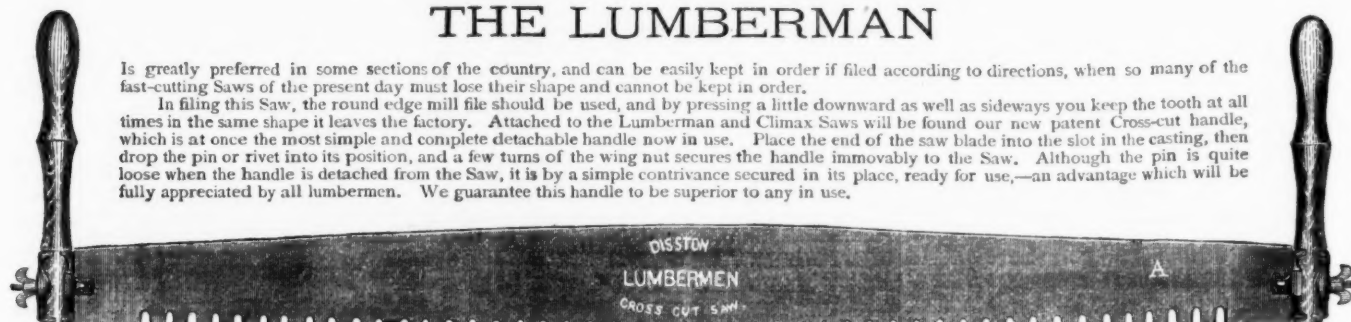
THE GREAT AMERICAN.

In introducing this Saw to the trade, the manufacturers would remark that it has been subject to the most severe tests, which have determined the fact that it is one of the **BEST CROSS-CUT SAWS** ever offered to the public. The most important peculiarities of this Saw are as follows:—
The outer teeth of each section are as sharp and effective cutting teeth as the teeth of a Rip Saw, while the middle or regulating tooth determines the extent of the cut in proportion to the bevel of said tooth. The more you bevel the centre tooth, the faster the Saw cuts, whereas, if the centre tooth be filed square the Saw takes less hold on your log, and requires less muscle to drive it. Thus you can regulate your Saw to suit the strength of the parties working it.
In using this improved Saw there is none of that "tearing of the wood, undue friction and drag," which in many other improved Cross-cut Saws demand so much muscular exertion without a commensurate result.
The manufacturers declare that there is no Cross-cut Saw in the market by which so much work can be done in ten hours, with so little exertion, as the "Great American Regulating Cross-cut."



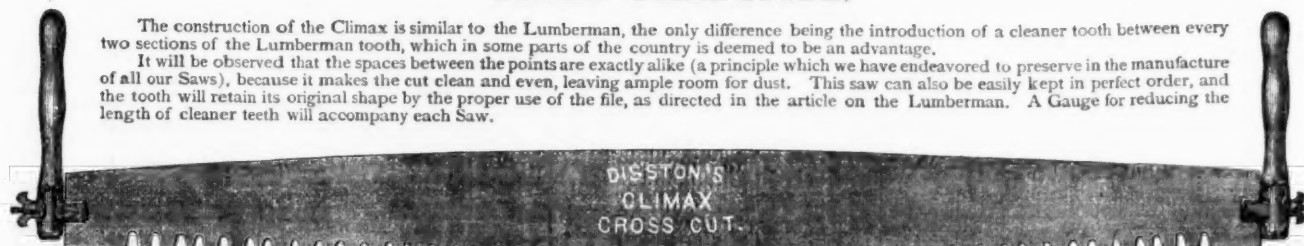
THE LUMBERMAN

Is greatly preferred in some sections of the country, and can be easily kept in order if filed according to directions, when so many of the fast-cutting Saws of the present day must lose their shape and cannot be kept in order.
In filing this Saw, the round edge mill file should be used, and by pressing a little downward as well as sideways you keep the tooth at all times in the same shape it leaves the factory. Attached to the Lumberman and Climax Saws will be found our new patent Cross-cut handle, which is at once the most simple and complete detachable handle now in use. Place the end of the saw blade into the slot in the casting, then drop the pin or rivet into its position, and a few turns of the wing nut secures the handle immovably to the Saw. Although the pin is quite loose when the handle is detached from the Saw, it is by a simple contrivance secured in its place, ready for use,—an advantage which will be fully appreciated by all lumbermen. We guarantee this handle to be superior to any in use.



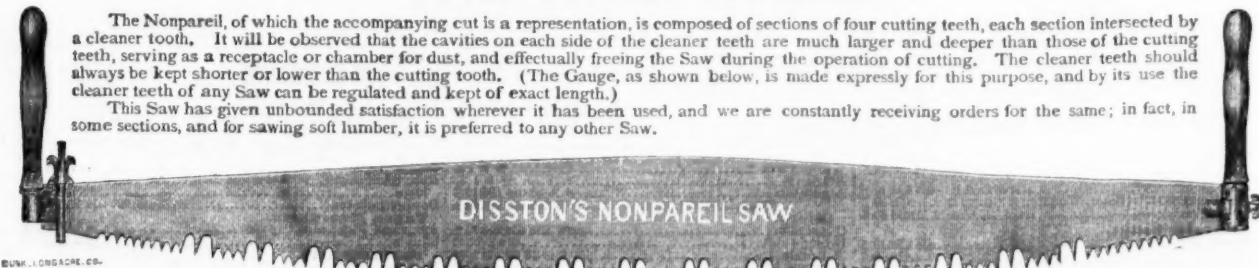
THE CLIMAX.

The construction of the Climax is similar to the Lumberman, the only difference being the introduction of a cleaner tooth between every two sections of the Lumberman tooth, which in some parts of the country is deemed to be an advantage.
It will be observed that the spaces between the points are exactly alike (a principle which we have endeavored to preserve in the manufacture of all our Saws), because it makes the cut clean and even, leaving ample room for dust. This saw can also be easily kept in perfect order, and the tooth will retain its original shape by the proper use of the file, as directed in the article on the Lumberman. A Gauge for reducing the length of cleaner teeth will accompany each Saw.



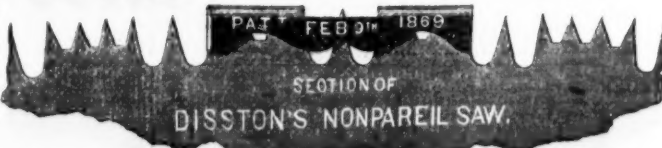
THE NONPAREIL.

The Nonpareil, of which the accompanying cut is a representation, is composed of sections of four cutting teeth, each section intersected by a cleaner tooth. It will be observed that the cavities on each side of the cleaner teeth are much larger and deeper than those of the cutting teeth, serving as a receptacle or chamber for dust, and effectually freeing the Saw during the operation of cutting. The cleaner teeth should always be kept shorter or lower than the cutting tooth. (The Gauge, as shown below, is made expressly for this purpose, and by its use the cleaner teeth of any Saw can be regulated and kept of exact length.)
This Saw has given unbounded satisfaction wherever it has been used, and we are constantly receiving orders for the same; in fact, in some sections, and for sawing soft lumber, it is preferred to any other Saw.



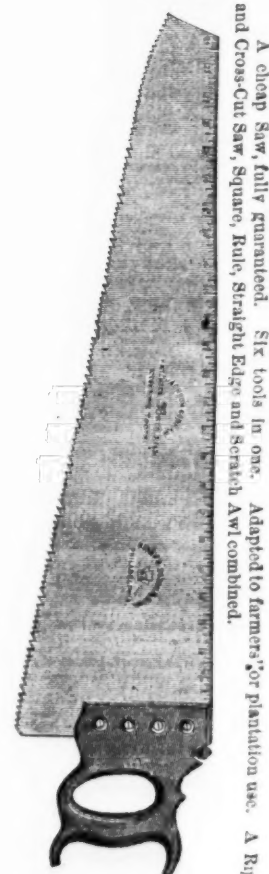
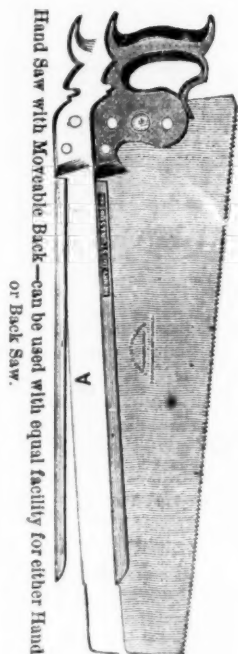
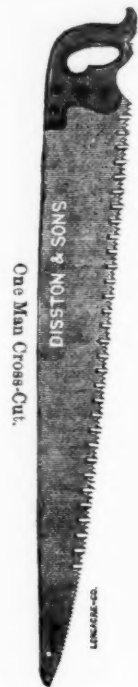
Gauge for Regulating Cleaning Teeth.

The cleaning teeth of all saws should be somewhat shorter than the cutting teeth, and, although shortened, they should be of uniform length throughout. The inner edge of the Gauge rests on the points of the cutting teeth, the cleaning teeth projecting through the opening in centre of Gauge. Reduce the projecting points, by means of a file, until arrested by the edges of the Gauge, which is made of hardened steel. Thus tooth after tooth can be rapidly and correctly reduced to an even length by any unskilled operator.



HENRY DISSTON & SONS, Philadelphia.

Showing the Gauge in Position for Filing the Cleaner Teeth.



New York Wholesale Prices, May 13, 1874.

HARDWARE.

[illegible]

Spear & Jackson's	\$5.50 to \$7 gold
Clips, Axe.	do 30 c
Norway or Best.	do 30 c
"Star," Superior Philadelphia.	dis 45 to 50
Cutlery Shovels.	
Iron Handled.	per doz, \$5 10 to 1 25
Wooden Handled.	per doz, 1 00 to 2 00
Coal Hods. —Smith, Burns & Co.	
Japanese.	\$9.00 9 75 10 50 12 50 15 per doz
Galvanized.	\$12.50 13 50 15 50 17 50 19 50
Morning Glory.	No. 15 16 17 do 30 c
Japanned.	\$12.50 13 50 15 50 17 50 per doz
Galvanized.	18 00 19 50 21 00 do 30 c
Cocks.	do 30 c
Braconing.	dis 25 to 15
Lock and globe.	dis 25 to 15
Coffee Mills.	
Horn and Box.	dis 15 c
Increase Willow's.	new list dis 15 c
Selmer's Pat.	\$9 50, \$10 50—dis 25 c
The Swift.	do 25 c
"American."	do 25 c
Swiss & Mfg. Co.	dis 25 c
Diamond, per doz \$1 00.	do 25 c
Compasses and Dividers.	
Horn.	dis 35 c
Excelsior.	do 30 c
Peck Stow & Wilcox.	dis 25 c
Coopers' Tools.	
Bradley's.	dis 15 to 20
Chas. E. Little.	dis 20 to 25
Swiss & Mfg. Co.	dis 15 to 20
Core Knives and Cutters.	
Bradley's.	do 10 c
Erow Bars.	
Chest Steel.	per lb 16 net
Iron, steel points.	per lb 7 c
Crackles.	do 10 c
Gaulins & Saws.	No. 20, 15c
Curry Combs.	do 15 c
Hotchkiss' and Kellogg's, Iron and Brass.	dis 15 to 10
Rubber.	per doz, \$9.00—dis 13 c
Schweitzer Mill, Co.	do 30 c
Silvered Glass.	old list dis 45 to 10
Cutlery.	
American Table.	net list
American Pocket.	dis 25 c
Tug Collins.	do 15 c
Embossed Gilt.	dis 25 c
Leather.	dis 15 c
Floor Springs.	
Gray's.	\$7.50 per doz—dis 40 to 10
Torre's Patent.	\$7.50 per doz—dis 40 to 10
Palmer's Japanese No. 6.	per doz \$7.50
"Silvered"	8 00
Challenge—	
Japanese.	per doz \$4 00 to 6 00
Bronzed.	per doz 5 00 to 7 00
Nickel Plated.	per doz 6 50 to 9 00
Steel.	per doz 7 50 to 10 00
5 Gross lots.	do 25 c
Drawing Knives.	
Adjustable Handled.	dis 10 c
Drills.	dis 25 c
Imperial's Ratchet.	do 30 c
Moore's Triple Acting Hatchet.	do 30 c
Whitney's Ratchet.	do 20 c
Each set \$2 net.	each \$2 net
Drug Mills.	
American Drug Mills.	do 30 c
Egg Beaters.	
Moulton's.	per doz net \$8.00 to \$9.00
Dover.	per doz net \$9.00
Refational.	per doz net \$9.00
Kanery.	per doz net \$9.00
Genuine Chester—Regular No.	per lb 7 c
Flour and FF.	dis 5 to 19 c
Washington Mills—Regular No.	per lb 7 c
Enamelled and Tinned Ware.	
Kettles.	dis 20 to 25 c
Sauce Pans, Glue Pots, &c.	dis 15 c
Leak-proof.	do 10 c
Brass Thread.	dis 60 to 10 c
Faucets.	do 60 c
Cork Lard Wood.	dis 50 c
Fenn's.	do 50 c
Cork Stops.	dis 50 c
Star.	dis 50 to 10 c
Fray's Patent Petroleum.	dis 10 to 10 c
Taylor's Pattern.	do 40 c
Chase and Mettelle.	do 40 c
Roller Plates.	
Files.	No 14c; dis 10 c
Nichols.	\$5 00 to \$ currency—dis 10 c
Newbound's.	\$ 25 to \$ gold
J. & J. Kelly Carr's.	\$ 25 to \$ gold
Stubs.	\$ 50 to \$ gold
Butcher's.	\$ 50 to \$ gold
Spears & Jackson's.	\$ 50 to \$ gold
Hargreaves, Smith & Co.'s.	\$ 50 to \$ gold
"Western."	\$ 50 to \$ gold
W. K. & C. Peace's "Imperial."	\$ 50 to \$ gold
Bean & Mur say, "Cyclops."	\$ 50 to \$ gold
Flaher's.	\$ 50 to \$ gold
Moss & Gable.	\$ 25 to \$ gold
Thos. Turner & Co. (Potter A. Frasse & Co.)	\$ 50 to \$ gold
Floral Tools.	
Flating Machines.	\$7 00 each net
Manville.	7 00 each net
Knox, with 4-inch rolls.	6 50 each net
O. K.	6 50 each net
Peerless, 4-inch rolls.	6 50 each net
Excelsior, No. 1.	4 75 each net
Diamond.	6 50 each net
Clifford 4-inch rolls.	6 50 each net
Empire.	5 00 each net
Flaher's 4-inch roll.	6 50 each net
K. F. M., 4½-inch roll.	6 50 each net
Myers' Fashion Fluter, 4½ inch rolls.	3 00 each net
Convey Brass Fluter, Sad Iron flattener.	\$1 75 to \$1 75
Fairy Self-Heater.	9 00 each net
Geneva Hand Fluter.	\$15 00 each net
Chauna, 4-inch rolls.	\$5 00 each net
Mrs. Corkes, 7 inch rolls.	6 50 to \$ 5 00
Forks.	
Hay, Manure & Spade.	dis 25 to 5 c
Freezers.	do 30 c
Turrey B. & W.	do 50 c
Tinned.	dis 25 c
Smith, Burns & Co., "Excelator" Polished.	dis 35 c
Gauges.	dis 45 to 10 c
Marking.	dis 10 c
Hammers.	dis 10 c
Emmet Hammer Co.	dis 5 c
Cheyne's.	dis 5 c
Veree.	dis 5 c
Wayland.	dis 5 c
Mint & Co.	dis 5 c
Magnetic Tack.	dis 20 to 10 c
Hatchets.	
Hammer and Hatchet.	dis 10 c
Quabtown, Axe, Pick and Sledge.	dis 10 c
Greenboro', Axe, Pick, Hammer, &c.	dis 10 c
Woodworth Axe, Pick and Sledge.	dis 10 c
Hick & Firm, Chisel, ass'd.	3 25—dis 10 to 10 c
" " large "	7 25—dis 10 to 10 c
" " small "	6 00—dis 10 to 10 c
Socket.	7 25—dis 10 to 10 c
File, Framing.	3 50—dis 10 to 10 c
Auger.	6 50—dis 10 to 10 c
Hangers.	
Bar Door.	revised list dis 6 to 10 c
And-Friction" (Rider, Wooster & Co.)	dis 30 c
Harness Snaps.	
Henshaw's.	dis 25 to 1

Lathing, 123...	per doz	9 00	9 00	10 00
Broad, 123...	per doz	8 00	8 50	9 00
" 123...	per doz	9 00	10 00	12 00
" 4...	per doz	18 00	18 00	18 00
Elephant, 123...	per doz	20 00	22 00	24 00
Shingling, No. 123...	per doz	9 00	9 50	10 00
Lathing, 123...	per doz	8 00	8 50	9 00
J. Verne & Co. Shingling, No. 123...	per doz	9 00	9 50	10 00
Claw, 123...	per doz	5 00	5 00	5 00
Shingling, 123...	per doz	5 00	5 00	5 00
Shingling, Nos. 123...	per doz	7 25	8 00	8 25
Shingling, 123...	per doz	7 00	7 00	7 00
Shingling, 123...	per doz	11 00	12 00	12 00
Flanges, Wrought Strap and T...	per doz	15 00	15 00	15 00
Providence Plate, 123...	per doz	15 00	15 00	15 00
Screw Hook, 123...	per doz	15 00	15 00	15 00
Heavy Wrought Hook, 123...	per doz	15 00	15 00	15 00
Screw Hook and Eye, 123...	per doz	15 00	15 00	15 00
Hoops, Sheet Shank, C. S. 123...	per doz	8 00	8 00	8 00
Socket, 123...	per doz	8 00	8 00	8 00
Strap, 123...	per doz	8 00	8 00	8 00
Planters - Wrought, 123...	per doz	8 00	8 00	8 00
Seavill Pattern (Wrought), 123...	per doz	8 00	8 00	8 00
Hoops, Clothes Line, 123...	per doz	8 00	8 00	8 00
Shank-Skinner, 123...	per doz	8 00	8 00	8 00
Wardens - Weston's No. 1, \$5.00; No. 2, \$7.00 per doz net	per doz	8 00	8 00	8 00
McGill's, 123...	per doz	8 00	8 00	8 00
Wrought Staples, 123...	per doz	8 00	8 00	8 00
Hat and Crown, 123...	per doz	8 00	8 00	8 00
Wrought Staples and Hooks and Staples, 123...	per doz	8 00	8 00	8 00
Grass, 123...	per doz	8 00	8 00	8 00
Whiffletree - Patent, 123...	per doz	8 00	8 00	8 00
Hoops and Eyes - Brass, 123...	per doz	8 00	8 00	8 00
Hoops Nails, 123...	per doz	8 00	8 00	8 00
In lots of 100 lbs. 5% discount, 123...	per doz	8 00	8 00	8 00
Pointed & Polished, 123...	per doz	8 00	8 00	8 00
Brundage, 123...	per doz	8 00	8 00	8 00
In lots of 500 lbs. 5% discount, 123...	per doz	8 00	8 00	8 00
Perkins Pattern (ready to drive), 123...	per doz	8 00	8 00	8 00
In lots of 1000 lbs. 5% discount, 123...	per doz	8 00	8 00	8 00
Buffalo Forged, 123...	per doz	8 00	8 00	8 00
Globe (Pointed and Polished), 123...	per doz	8 00	8 00	8 00
In lots of 100 lbs. 5% discount, 123...	per doz	8 00	8 00	8 00
Patent Finish, 123...	per doz	8 00	8 00	8 00
Vulcan (Blued, pointed, ready to drive), 123...	per doz	8 00	8 00	8 00
In lots of 500 lbs. 5% discount, 123...	per doz	8 00	8 00	8 00
New London Forge, 123...	per doz	8 00	8 00	8 00
Iron, 123...	per doz	8 00	8 00	8 00
White's, 123...	per doz	8 00	8 00	8 00
Dunlap's, 123...	per doz	8 00	8 00	8 00
Kettles, 123...	per doz	8 00	8 00	8 00
Knives, 123...	per doz	8 00	8 00	8 00
Boys' Pocket Knives, 123...	per doz	8 00	8 00	8 00
Shoe, 123...	per doz	8 00	8 00	8 00
Hay and Straw, "Wadsworth's", 123...	per doz	8 00	8 00	8 00
Basic - Common, 123...	per doz	8 00	8 00	8 00
Plush Tire, 123...	per doz	8 00	8 00	8 00
India, 123...	per doz	8 00	8 00	8 00
Melting, 123...	per doz	8 00	8 00	8 00
Brady's Patent, 123...	per doz	8 00	8 00	8 00
Etma, 123...	per doz	8 00	8 00	8 00
De Beque, 123...	per doz	8 00	8 00	8 00
Locks and Latches, 123...	per doz	8 00	8 00	8 00
Crabnet - Gaylord, 123...	per doz	8 00	8 00	8 00
Trunk, 123...	per doz	8 00	8 00	8 00
Shepherdson, 123...	per doz	8 00	8 00	8 00
American Lock Co., 123...	per doz	8 00	8 00	8 00
Pad, 123...	per doz	8 00	8 00	8 00
Barnes & Deitz, 123...	per doz	8 00	8 00	8 00
Yale Lock Co., 123...	per doz	8 00	8 00	8 00
Trenton Lock Co., 123...	per doz	8 00	8 00	8 00
Brundage, 123...	per doz	8 00	8 00	8 00
Norwich, 123...	per doz	8 00	8 00	8 00
Russell & Erwin, 123...	per doz	8 00	8 00	8 00
Norwalk, 123...	per doz	8 00	8 00	8 00
Malloy, Wheeler & Co., 123...	per doz	8 00	8 00	8 00
F. R. Corbin, 123...	per doz	8 00	8 00	8 00
Parsons, Wm. 123...	per doz	8 00	8 00	8 00
Jacobus & Nixson Mfg. Co. 123...	per doz	8 00	8 00	8 00
Meats, Hoot Lignumvitae, 123...	per doz	10 00	10 00	10 00
Dixon's (P. S. & W.), 123...	per doz	10 00	10 00	10 00
per doz, \$14 00 \$17 00 \$19 00 \$30 00	per doz	14 00	17 00	19 00
Hales' 123...	per doz	11 00	12 00	12 50
per doz, \$37 00 \$39 00 \$42 00	per doz	37 00	39 00	42 00
Miles Challenge, 123...	per doz	20 00	20 00	20 00
per doz, \$27 00 \$30 00 \$30 00	per doz	27 00	30 00	30 00
Perry's Champion (P. S. & W.), 123...	per doz	22 00	27 00	30 00
per doz, \$22 00 \$27 00 \$30 00	per doz	22 00	27 00	30 00
Woodruff's (P. S. & W.), 123...	per doz	15 00	15 00	15 00
America, 123...	per doz	15 00	15 00	15 00
per doz, \$6 00 \$9 00 \$14 00 \$15 00 \$20 00 \$75 00	per doz	6 00	9 00	14 00
Holmeses Gates, 123...	per doz	10 00	10 00	10 00
Tinned ends, 123...	per doz	10 00	10 00	10 00
Patent Self-Measuring, 123...	per doz	14 00	14 00	14 00
Lipson, 123...	per doz	10 00	10 00	10 00
Mortars and Pestles, 123...	per doz	10 00	10 00	10 00
Iron, 123...	per doz	10 00	10 00	10 00
Wood Choker, 123...	per doz	16 00	16 00	16 00
Round, Wire, 123...	per doz	2 00	2 00	2 00
Case, 123...	per doz	2 00	2 00	2 00
per doz, \$2 00 \$2 00 \$2 00	per doz	2 00	2 00	2 00
Flowers, Lawn, 123...	per doz	25 00	25 00	25 00
Nails - See Trade Reference, 123...	per doz	25 00	25 00	25 00
Nuts and Washers, 123...	per doz	25 00	25 00	25 00
Washers, 123...	per doz	25 00	25 00	25 00
Oil Stones, 123...	per doz	25 00	25 00	25 00
Shells, 123...	per doz	25 00	25 00	25 00
Waspita, No. 2, 123...	per doz	25 00	25 00	25 00
Burns, 123...	per doz	25 00	25 00	25 00
Hudson, 123...	per doz	25 00	25 00	25 00
Silpe, 123...	per doz	25 00	25 00	25 00
Oliver, 123...	per doz	25 00	25 00	25 00
Broughton's, 123...	per doz	25 00	25 00	25 00
Patent, 123...	per doz	25 00	25 00	25 00
Common Tin, 123...	per doz	25 00	25 00	25 00
Zinc, 123...	per doz	25 00	25 00	25 00
Burns and Copper, 123...	per doz	25 00	25 00	25 00
Picks, 123...	per doz	25 00	25 00	25 00
Wasque H. R., 123...	per doz	25 00	25 00	25 00
Wasque Coal, 20 lbs., \$5.00 15 00 16 00 17 00 18 00	per doz	5 00	15 00	16 00
Extra 10 lbs 20 lbs 4 months ending Jan. and July.	per doz	5 00	15 00	16 00
Richards Patent, 123...	per doz	40 00	40 00	40 00
Pinking Irons, 123...	per doz	40 00	40 00	40 00
Chapin's, 1st quality, 123...	per doz	30 00	30 00	30 00
Sandusky Tool Co., 1st quality, 123...	per doz	30 00	30 00	30 00
Oil Tool Co., 1st quality, 123...	per doz	30 00	30 00	30 00
Omawco Tool Co., 1st quality (Scots), 123...	per doz	30 00	30 00	30 00
Howard's, 1st quality, 123...	per doz	30 00	30 00	30 00
Flame Irons, Butcher's, \$5.00 to 2 gold - new list	per doz	5 00	10 00	10 00
Chapin's, 123...	per doz	10 00	10 00	10 00
Spear & Jackson's, 5.50 to 2 gold - new list	per doz	5 50	10 00	10 00
Sandusky Tool Co. 123...	per doz	10 00	10 00	10 00

Butler's Patent	dis 38½ c
Pumps and Levels.	
standard Rule Co.'s New Adjustable	dis 60 & 10 g
Standard Rule and Level Co.	dis 60 & 10 g
Stanley Rule and Level Co.	dis 60 & 10 g
Douglas Clatern, etc.	new list dis 25 c
S. & F.	new list dis 25 c
Rails.	
Cast Steel	dis 30 g
\$3 00 9 00 10 10 11 00	
Malleable	14 teeth. dis 30 g
\$5 00 6 50 6 00 6 50	
	15 teeth.
Razor Straps.	
Genuine Emerson.	dis 25 c
Hunt's	dis 25 c
Kivets.	
Iron and Flamed.	dis 25 c
Stanley's Patent	dis 25 c
Copper Rivets and Burns	new list dis 10 c
Rods.	
Steel	new list dis 30 g
American Patent.	dis 30 g
Rollers.	
Revised list	dis 60 & 10 g
Rope.	
Manufacturers' List	
Manilla	½ inch and larger 17 c
1/4 inch 18 c	
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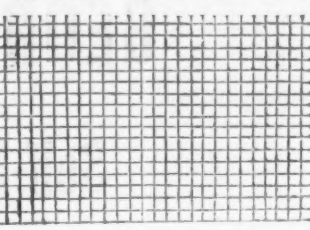
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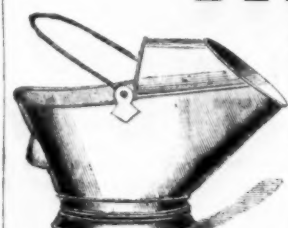
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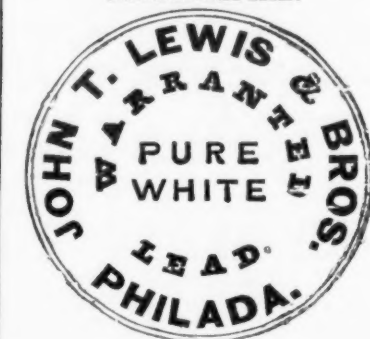
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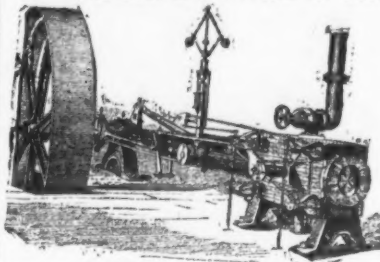
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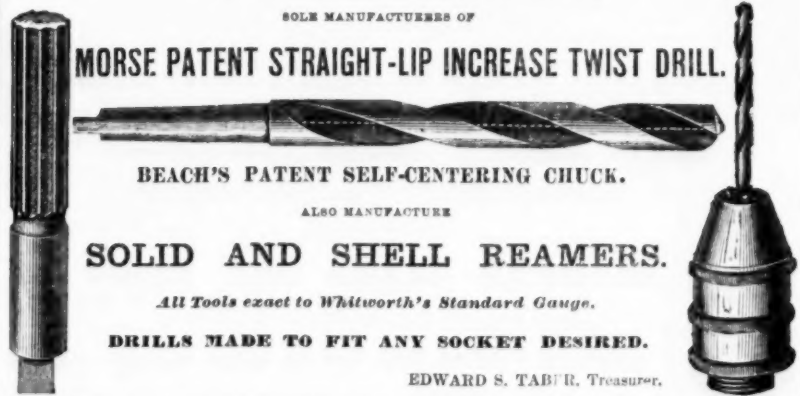
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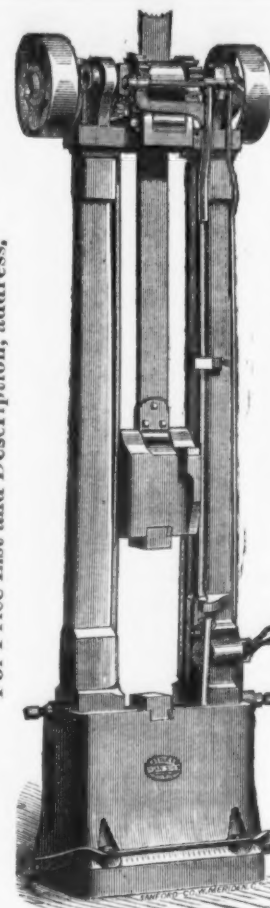
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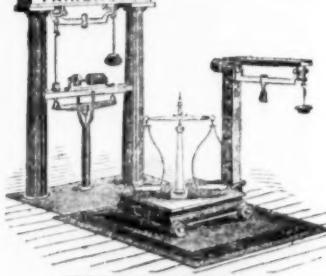
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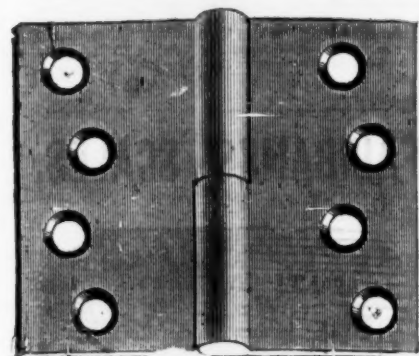
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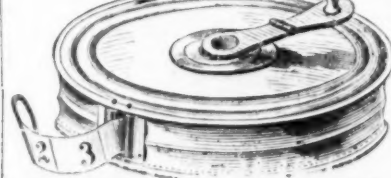
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Manufacturers of Paine's Patent Steel Standard Measuring Tapes, for Surveyors, Engineers and Mechanics requiring a correct measure of great length according to U. S. Standard. Also of Tape measures for the same trades, Landmen, Machinists, Tailors, Shoemakers, Dressmakers, &c. Catalogues on application.

LINFORTH, KELLOGG & CO.,

Wholesale Hardware House

AND

Manufacturers' Agents,

Nos. 3 & 5 FRONT STREET, SAN FRANCISCO, CAL.

Sole Agents for the Pacific Coast, for the following leading Goods.

The Powell Tool Co.'s Axes, Edge Tools, Picks, Mattocks, &c.

The Sandusky Tool Co.'s Planes, Plane Irons, Carpenters', Cabinet Makers' and Coopers' Tools.

The Black Diamond Files, G. & H. Barnett, Manufacturers, Philadelphia.

Rumsey & Co.'s Pumps, Hydraulic Rams, Steel Amalgam Bells, Fire Engines, &c.

The Woolworth Handle Works, Axe, Pick, Sledge and other Handles.

ALSO AGENTS FOR

The Enterprise Mfg. Co.'s Coffee and Spice Mills, Molasses Gates, Bung Boreers, &c.

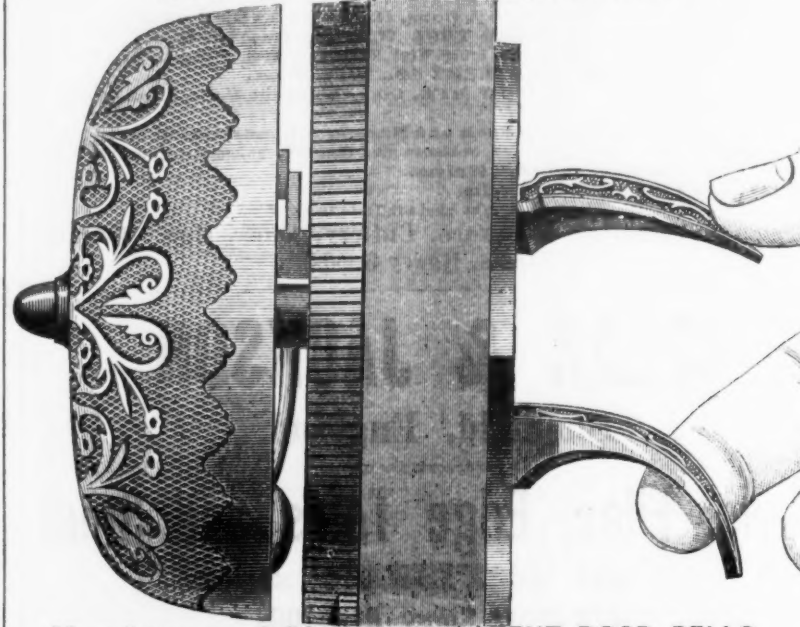
The U. S. Screw Co.'s Gimlet Pointed Screws.

The Union Steel Screw Co.'s Gimlet Pointed Steel Screws.

New York Office, 96 Chambers St., W. B. FOX, Manager.

The Hart, Bliven & Mead Mfg. Co.

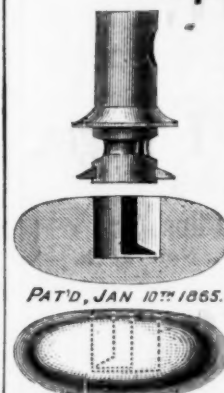
18 & 20 Cliff and 243 & 245 Pearl Street, NEW YORK.



Manufacturers of CONNELL'S PATENT DOOR BELLS.

For Prices and Description, see The Iron Age, April 24, page 24.

Improved Door Knobs.



PAT'D, JAN 10th 1865.

On the 10th January, 1865, we obtained Letters Patent for improved method of securing necks to Mineral and Porcelain Door Knobs, which improvement was used by us long enough to prove its utility, but on account of unsettled claim of joint ownership by former partner, its use was discontinued. Having now made a further improvement, for which we have made application for a Patent, we are now making the BEST SECURED and MOST DURABLE Mineral and Porcelain Door Knobs ever offered in this or other markets.

We solicit orders for these Knobs at our regular prices for old styles, with the understanding that if any can be loosened from or gotten off the necks without breaking the tops, they may be held by the purchaser subject to our order, with expenses added.

See The Iron Age, of August 21st., page 11, for illustrated description of our patent Telescope Locks and Latches, with patent Flat Steel Perforated Keys.

Address

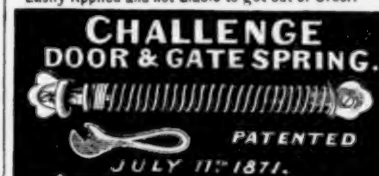
BRANFORD LOCK WORKS,

Branford, Conn.

Or, THE HART, BLIVEN & MEAD MANUFACTURING CO., Agents,

18 & 20 Cliff and 243 & 245 Pearl Streets, New York

"Easily Applied and not liable to get out of Order."—From Report of Judges at American Institute Fair, 1872.



PATENTED

JULY 11th 1871.



PATENTED

JULY 11th 1871.

The Challenge Door Spring Co.,

Patented. Exclusive Manufacturers of the

[March, 1873]



PATENTED

JULY 11th 1871.

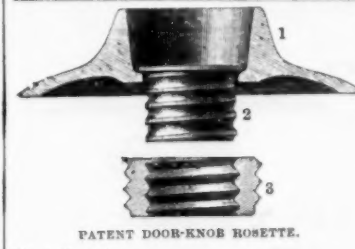


PATENTED

JULY 11th 1871.

In Appearance the Most Beautiful. In Action the Most Graceful. In Use the Most Reliable. The Challenge Springs are manufactured from Steel Wire, tempered by an Improved Process, the result of repeated experiments, and must not be classed by dealers with the numerous worthless "Coil Springs" made from common Bed Spring Wire.

No. 49 Ann Street, NEW YORK.



PATENT DOOR-KNOB ROSETTE.

No. 1. Rosette. No. 2. Screw entering No. 3. No. 3. Stationary bushing remaining firmly in door.

Particular attention given to Light Manufacturing for BRASS & IRON FOUNDRY, SILVER & NICKEL PLATING. Orders Solicited. We would call the particular attention of the trade to our PATENT IMPROVED ROSETTE for Door Knobs. This Rosette does away with the small screws and cannot work loose. It can be applied four to one faster than any others. Can be applied to old doors.

Factory on the Valley R. R. at Wethersfield, Conn.

Communication from Hartford (2 miles) by horse or steam cars.

The Wethersfield Novelty Co.

MANUFACTURERS OF

Builders' Hardware and Plated Goods.

BRASS AND IRON FOUNDRERS.

PHILADELPHIA.

(Compiled weekly by Lloyd, Shipley & Co.)

Terms, 30 days. For 60 or 90 days, interest added at 10 per cent. per annum.

Avails. —Solid Cast Steel.....	\$ 1.10
Wrought Iron.....	1.00
Wrought Steel.....	1.10
Wrought Iron.....	1.00
Wrought Steel.....	1.10
Apple Parers. —Reading Improved.....	per doz \$3.50
Victor, Improved.....	8.25
Turn Table.....	8.50
Discount for 25 dozen lots.....	50c
Ases. —Mann's Light.....	Per doz \$13.00 @ 14.00
Print & Light.....	10.00 @ 11.00
Red Indian, all sizes.....	12.50 @ 13.00
Red Chief, all sizes.....	12.50 @ 13.00
Crown Prince.....	12.50 @ 13.00
Augers and Auger Bits. —Pierce's Pat.....	dis 25 @ 25.50
Bits & Bits.....	dis 30 @ 30.50
Don'ts' Pat. Augers.....	dis 30 @ 30.50
Cast Steel Bits.....	dis 30 @ 30.50
Crow's Pat. Augers.....	dis 30 @ 30.50
Don'ts' Pat. Hollow Augers.....	dis 30 @ 30.50
Stearns' Patent Hollow Augers.....	dis 30 @ 30.50
Russell Jennings' Bits.....	dis 30 @ 30.50
Barre & Sons' Augers.....	dis 30 @ 30.50
Don'ts' Pat. Augers.....	dis 30 @ 30.50
Watrous' Augers.....	dis 30 @ 30.50
Belters. —Lynch & Clark.....	dis 15
Chattillon's.....	dis 15
Morton's.....	dis 15
Common Spring with Hook.....	per doz \$1.50 @ 1.55
Bells. —Levin Bros. Mfg. Co. Light Hand.....	dis 10 @ 10.50
Other make light.....	dis 10 @ 10.50
Swiss Pattern Hand Bells.....	dis 10 @ 10.50
Connell's Pat. Bells.....	dis 10 @ 10.50
Great Western and Kent.....	dis 10 @ 10.50
Boring Machines. —Bates Mfg. Co., complete with augers.....	dis 15 @ 20
Douglas Mfg. Co., complete with augers.....	dis 15 @ 20
Common boring machines, no augers.....	dis 15 @ 20
Angular.....	dis 15 @ 20
Boils. —Eastern Carriage Boils.....	dis 10 @ 10.50
Western.....	dis 10 @ 10.50
Wrought Saddle Boils.....	dis 10 @ 10.50
Cast.....	dis 10 @ 10.50
Scelly's Pat. Saddle Boils.....	dis 10 @ 10.50
Braces. —Barber's.....	dis 10 @ 10.50
Reckless.....	dis 10 @ 10.50
Bartholomew's American Boils.....	dis 10 @ 10.50
Spencer.....	dis 10 @ 10.50
Butts. —Cast Fast Joint.....	dis 10 @ 10.50
Broad.....	dis 10 @ 10.50
Cast Loose Joint.....	dis 10 @ 10.50
Acorn, Loose Pin.....	dis 10 @ 10.50
Wrought Loose Pin.....	dis 10 @ 10.50
Table Hinges and Back Flaps.....	dis 10 @ 10.50
Narrow.....	dis 10 @ 10.50
Loose Joint.....	dis 10 @ 10.50
Reversible.....	dis 10 @ 10.50
Parker's Blind Butts.....	dis 10 @ 10.50
Shepard's.....	dis 10 @ 10.50
Clark's.....	dis 10 @ 10.50
Cherrytree.....	dis 10 @ 10.50
Call & Porter's.....	dis 10 @ 10.50
Chains. —Pump Chain.....	dis 10 @ 10.50
Calvanized Chain.....	dis 10 @ 10.50
Best Proof Chain.....	dis 10 @ 10.50
Chain, 1/2 in. per lb. less than discount.....	dis 10 @ 10.50
Chisels. —Socket Frowning.....	dis 10 @ 10.50
Socket Frowning.....	dis 10 @ 10.50
Tang.....	dis 10 @ 10.50
Beck's Framing and Frowning.....	dis 10 @ 10.50
Centers—Foralida White.....	dis 10 @ 10.50
Iron.....	dis 10 @ 10.50
Clothes Wringers. —General.....	per doz \$7.00 @ 7.50
Reversible.....	dis 10 @ 10.50
Providence.....	dis 10 @ 10.50
Orders for 5 dozen, discount \$3 per dozen.....	
Coff Wringers. —Iron Frame.....	per doz \$6.00 @ 6.50
Cup Mills. —Common Box.....	dis 10 @ 10.50
Patent Box and Side.....	dis 10 @ 10.50
Cutlery. —American Pocket (best).....	dis 10 @ 10.50
Landers, Fray & Clark, J. Russell & Co. and L. Lamson & Goodnow Mfg. Co. Manufacturers' net prices.....	
Drawing Knives. —Hart Mfg. Co. s.....	dis 10 @ 10.50
Concave Adjustable Handle.....	dis 10 @ 10.50
Beatty.....	dis 10 @ 10.50
Eye Pins.	dis 10 @ 10.50
Tinned.....	dis 10 @ 10.50
per doz \$2.00 @ 2.50	
Burnished.....	dis 10 @ 10.50
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Files.	dis 10 @ 10.50
Nicholson Mill Files.....	dis 10 @ 10.50
Bastard.....	dis 10 @ 10.50
Taper.....	dis 10 @ 10.50
Becker's Mill.....	dis 10 @ 10.50
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Taper.....	dis 10 @ 10.50
Moss & Gamble.....	dis 10 @ 10.50
Bastard.....	dis 10 @ 10.50
Fluting Machines.	dis 10 @ 10.50
R. F. M. 4 in. rolls.....	dis 10 @ 10.50
Machines—An 1/2 in. rolls.....	dis 10 @ 10.50
M. Knox—1 in. rolls.....	dis 10 @ 10.50
—1 in. rolls.....	dis 10 @ 10.50
Hammers.	dis 10 @ 10.50
Yerkes & Plumb.....	dis 10 @ 10.50
Hammond & Son.....	dis 10 @ 10.50
Verde.....	dis 10 @ 10.50
Hatchets.	dis 10 @ 10.50
Beatty's.....	dis 10 @ 10.50
Shingling and Half.....	dis 10 @ 10.50
Yerkes & Plumb.....	dis 10 @ 10.50
Shingling and Half.....	dis 10 @ 10.50
Claw.....	dis 10 @ 10.50
Hinges. —Stran & T. advanced Feb. 6.....	dis 10 @ 10.50
Booney's No. 1 and 2.....	dis 10 @ 10.50
Horse Nails.	dis 10 @ 10.50
Available.....	dis 10 @ 10.50
Globe.....	dis 10 @ 10.50
Brandt.....	dis 10 @ 10.50
Putnam.....	dis 10 @ 10.50
On Available, Globe and Brandt 1000 s lots.....	dis 10 @ 10.50
Knobs. —Door, Mortise and Rim.....	dis 10 @ 10.50
Makes in Combination.....	dis 10 @ 10.50
Mineral and Rim.	dis 10 @ 10.50
Locks and Latches. —Rim and Mortise.....	dis 10 @ 10.50
Till and Cabboard.....	dis 10 @ 10.50
American Padlocks.....	dis 10 @ 10.50
Scandinavian Pad Lock.....	dis 10 @ 10.50
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Steel.

THREE CLASS PRIZE MEDALS. MEDAL OF HONOUR, SOCIETY OF ARTS & INDUSTRY, LONDON, 1856. 1st CLASS PRIZE MEDAL, CLASS 1st UNIVERSAL EXHIBITION OF INDUSTRY, PARIS, 1855.

COCKER BROTHERS

SUCCESSORS TO
SAM'L COCKER & SON,
(Established 1752.)
SHEFFIELD, ENGLAND

MANUFACTURERS OF
CAST, SHEET, AND BLISTER STEEL, OF EVERY DESCRIPTION.
BEST CAST STEEL WIRE, ADAPTED SPECIALLY FOR MECHANICAL PURPOSES;
Also for ROPES, NEEDLES, FISH HOOKS, PINS, ORNOLINE, &c.

BEST CAST STEEL FILES, SAWS, EDGE TOOLS,
HACKLES, GILLS, CARD CLOTHING, CARD TEETH, HOOKS AND GILL PINS,
FISH HOOKS, NEEDLES, &c.

ALSO
GENERAL MERCHANTS.

Agent, JONATHAN HATTERSLEY, Cincinnati, O.

WM. JESSOP & SONS,

MANUFACTURERS OF

STEEL,

AND IMPORTERS OF IRON
SHEFFIELD, ENGLAND.

PRINCIPAL DEPOTS:

NEW YORK, Nos. 91 & 93 John Street. BOSTON, No. 141 Federal.
ST. LOUIS, No. 714 North Second Street.

AGENCIES:

PHILADELPHIA, Jas. C. Hand & Co. PROVIDENCE, Nightingale & Kilton.
CHICAGO, Crerar, Adams & Co. NEW ORLEANS, Folger & Co.
CINCINNATI, Augustus Wessel. SAN FRANCISCO, Huntington, Hopkins & Co.

F. W. MOSS,

Successor to JOSHUA MOSS & GAMBLE BROS.

FRANKLIN WORKS,
WADSWORTH BRIDGE WORKS,
WALKLEY WORKS,

SHEFFIELD, ENGLAND.

MANUFACTURER AND IMPORTER OF

STEEL AND FILES.

Principal Depots: 80 John St., N. Y., and 512 Commerce St., Phila.

MOSS & GAMBLE SUPERIOR C. S. "FULL WEIGHT" FILES,

Cast Steel Hammers and Sledges. Also, "M. & G." Anvils and Vises.

WARRANTED CAST STEEL, especially adapted for DIES and TURNING TOOLS, DRILLS, COLD CHISELS,

PUNCHES and all kinds of MACHINISTS' TOOLS.

Celebrated Improved Mild Centre Cast Steel, for Taps, Reamers, and Milling Tools.

Warranted not to crack in hardening Taps of any size.

Swede Spring Steel, especially adapted to Locomotive and Railway Car Springs.

English Spring and Plow Plate Steel. Also, manufacturer of

Steel Cast Steel, Shear, German, Round Machinery, Hammer, Fork and Shovel Steel

And GENERAL MERCHANT.

A. M. F. WATSON, General Agent.

WILSON HAWKSWORTH, ELLISON & CO.,

MANUFACTURERS OF

STEEL, STEEL WIRE, &C.,

AND GENERAL MERCHANTS,

CARLISLE WORKS, SHEFFIELD, ENGLAND.

AGENCIES:

New York, 72 John Street.

Philadelphia, 505 Commerce Street.

Boston, 21 Oliver Street.

New Orleans, La., 111 Gravier St.

BARROW HEMATITE STEEL COMPANY,

LIMITED.



BARROW IN FURNESS,
LANCASHIRE, ENGLAND.

MANUFACTURERS OF

Steel Rails, Tyres, Wheels,
Axles, Shafting, Boiler & Ship Plates, Bessemer Pig Iron, etc., etc.

CHAS. CONGREVE & SON,

Sole Agents for the United States,

104 & 106 John Street, opposite Cliff Street, NEW YORK.

J. & RILEY CARR,

MANUFACTURERS OF SUPERIOR

STEEL

For Tools, Cutlery, Saws, Files, Augers, Gimbets, &c.; Sheet Cast Steel for
SPRINGS AND STAMPING COLD;

ALSO THE CELEBRATED

DOG BRAND FILES,

Unsurpassed, if equal in quality.

Bailey Lane Works, Sheffield, England.

Warehouse, 82 John St., New York.

Established 1810.



HENRY MOORE, Attorney.

Steel.

SANDERSON BROTHERS & COMPANY,

(LIMITED)

MANUFACTURERS OF THE

CELEBRATED CAST STEEL,

Warranted Most Superior for Tools and Granite Rock Drills.

DARNALL WORKS,
ATTERCLIFFE FORGE,
WEST STREET WORKS,

SHEFFIELD, ENGLAND.

IMPORTERS OF FILES,

AND

AGENTS FOR ARMITAGE'S GENUINE MOUSEHOLE ANVILS.

NEW YORK, Edward Frith, 16 Cliff.

BOSTON, H. L. Richards, 18 Battery March.

PHILADELPHIA, Wm. H. Sowers.

CLEVELAND, O., Cleveland, Brown & Co.

NEW ORLEANS, Rich'd Rhodes, 71 Camp.

BALTIMORE, Md., Wm. H. Cole.

MONTREAL, Saint Paul St.

NEW HAVEN, Ct., Atwater, Wheeler & Co.

FRANCIS HOBSON & SON,

97 John Street, NEW YORK,

Sole Manufact'rs of "CHOICE" Extra Cast Steel.

Manufacturers of all Descriptions of Steel.

Manufacturers of Every Kind of Steel Wire.

Don Works, Sheffield, England.

JOHN HOGAN, Agent.

S. & C. WARDLOW,

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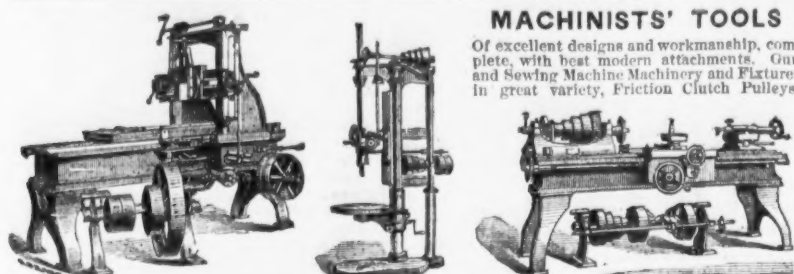
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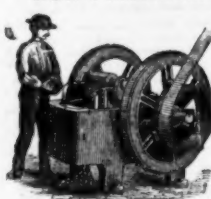
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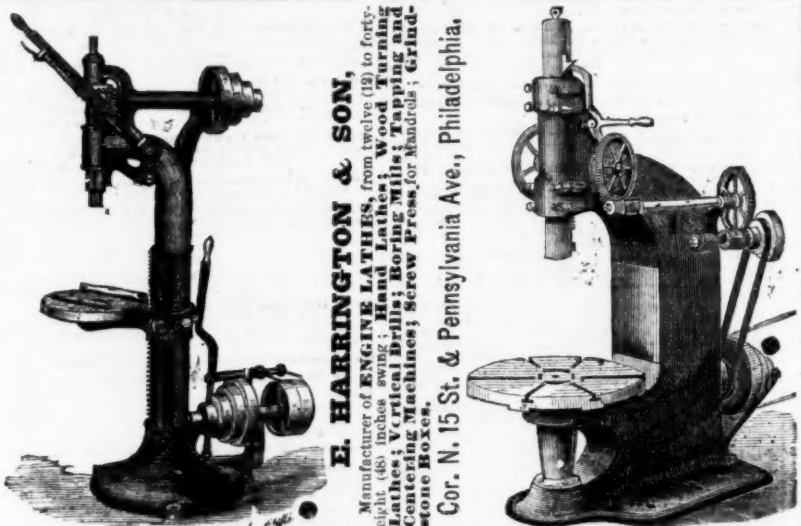


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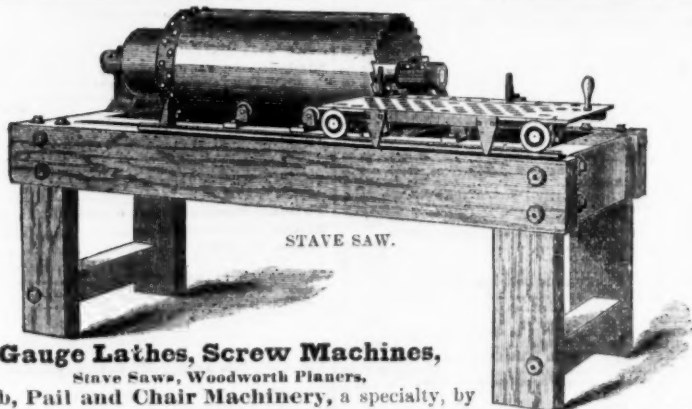
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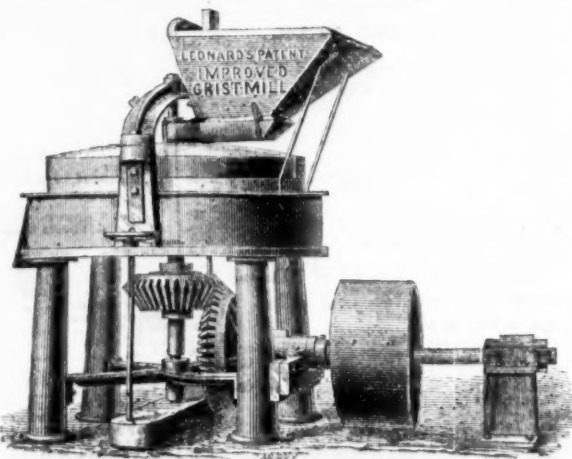
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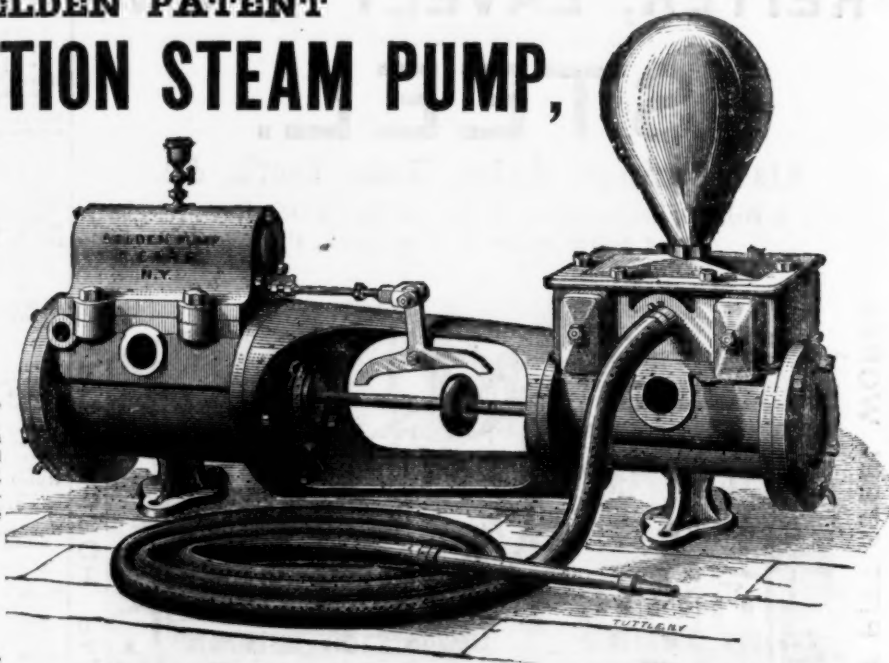
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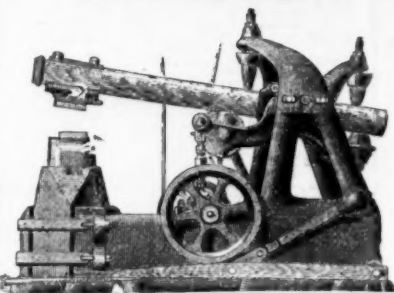
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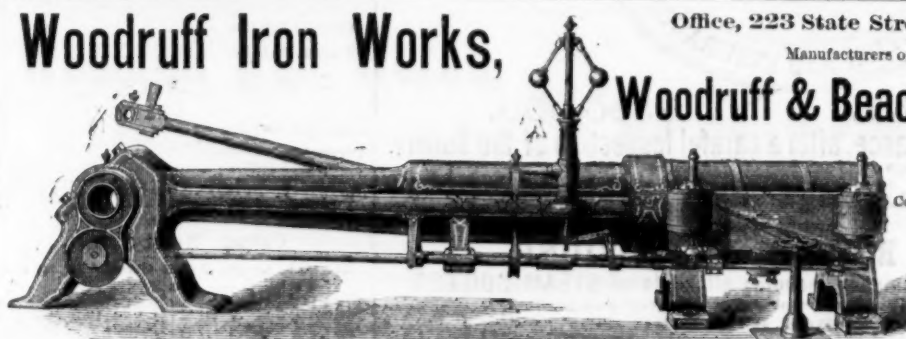
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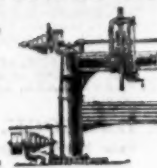


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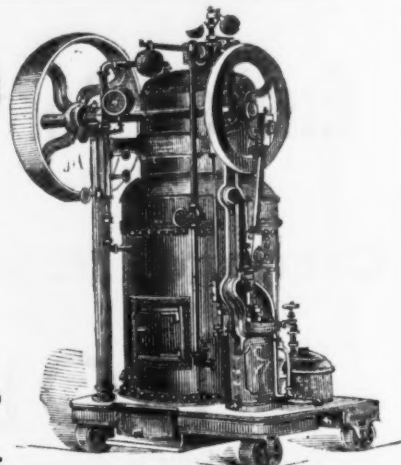
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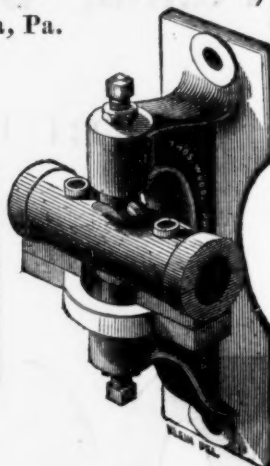
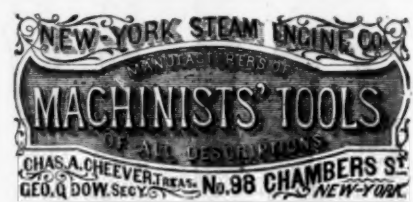
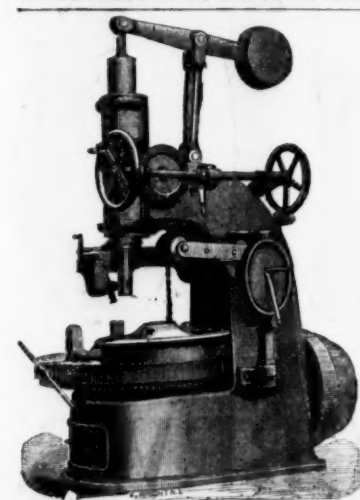
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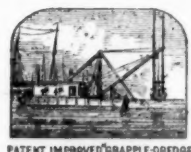
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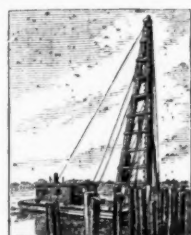
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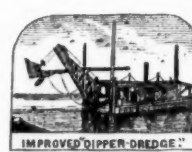
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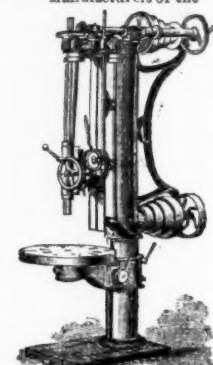
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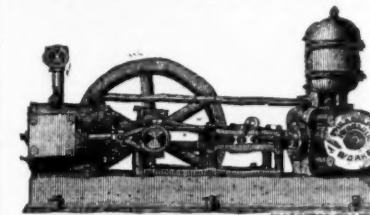
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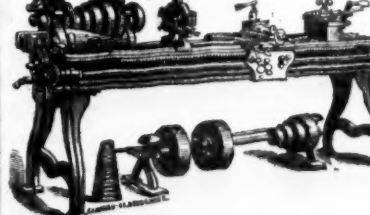
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